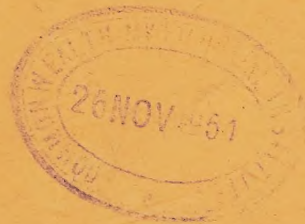


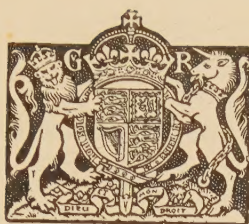


TANGANYIKA

DEPARTMENT OF AGRICULTURE
ANNUAL REPORT
1949



1951
PRINTED BY THE GOVERNMENT PRINTER
DAR ES SALAAM
Price Shs. 6/-



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DEPARTMENT OF AGRICULTURE

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TANGANYIKA

DEPARTMENT OF AGRICULTURE ANNUAL REPORT, 1949

INTRODUCTION

AGRICULTURAL POLICY

Agricultural policy which continued as in 1948 was defined in the 1948 Annual Report and is summarised as follows :—

- (a) to make the Territory as self-supporting as possible, to contribute towards the interests of East Africa as a whole by the maximum production of foodstuffs, and by the building up of reserves ;
- (b) to maintain and increase the export surpluses of the main export crops especially sisal, cotton, coffee, oilseeds and tobacco as the Territory's contribution to world needs and to the general improvement of the welfare of the people.

While the extension of mechanical cultivation may prove to be necessary to bring about a greater output of foodstuffs and export crops, the continuation of the policy described above demands close study of the maintenance and improvement of soil fertility and of the measures necessary to preserve the land and other natural resources.

An additional policy must now be added :

- (c) to develop the fishery resources of the Territory both inland and marine, for the purpose of improving supplies of fish and the diet of the people.

STAFF

The prosecution of agricultural and fishery plans is dependent upon scientific, expert, and executive staff and while it is pleasing to note the arrival of a number of new men the position is far from satisfactory. Of newly qualified Agricultural Officers eight were appointed and took up their posts—but four senior men retired, two others are likely to go on pension, and two were transferred. The real staff position remains more or less as it was with eighteen vacancies for Agricultural Officers yet to be filled. On the other hand a new Entomologist and a Beeswax Officer arrived, most valuable additions to the specialist section of the Department. In the field we have been more fortunate. The Agricultural Assistant strength is much better than it was and many of our new men are doing sound jobs.

SECTION I.—AGRICULTURE IN TANGANYIKA IN 1949

WEATHER AND GENERAL REVIEW OF THE YEAR

The rainfall towards the end of 1948 was unseasonable and insufficient, and this was followed by the worst drought for fifty years. Dry conditions persisted over practically the whole of the Territory during 1949 and the rains which fell during the period January to April were well below average and of little benefit to crops and for the maintenance of water supplies. The shortfall was particularly marked in the eastern parts of the Lake and Western Provinces and in the Central Province, and a serious failure of grain crops occurred in these areas. The drought also seriously affected production in parts of the Eastern, Tanga and Northern Provinces. In the coastal areas the seasonal rainfall for 1949 was very much below average and at Dar es Salaam was the lowest recorded since 1898.

The total acreage of food crops planted in 1949 was higher than that in 1948, but the total production was very poor. The unfavourable weather conditions did not affect the main economic crops to the same extent.

The cotton crop was above the average, the output of tobacco was maintained, and that of sisal and coffee increased.

Very limited surpluses of foodcrops were sold in the local markets in areas where production was more favourable. This helped to meet the deficiencies in the shortage areas, but the demand for imported grain supplies to meet the Territorial deficiencies was considerably higher than normal, and foreshadowed the need for importing very large supplies before the next harvest.

Appendix I gives the monthly rainfall in inches for the season 1948/49 and the year 1949 at each Provincial Headquarters.

ESTATE AGRICULTURE

Sisal, the most important plantation crop of the Territory, broke all previous records by producing 123,296 tons during the year despite the unfavourable season.

Production of coffee in the main coffee-growing areas decreased from 13,604 tons in 1948 to 12,890 tons in 1949. Of the 12,890 tons produced, only 1,647 tons was estate grown; the balance of 11,243 tons was produced by Africans in the Northern, Tanga, Lake and Southern Highlands Provinces.

The prolonged drought had an adverse effect on the coffee estates in the Northern Province, and production of estate grown coffee in the Moshi, Arusha and Mbulu Districts was half that of last season, being 1,301 tons as compared with 2,635 tons in 1948. The Mbosi estates, Mbeya District, harvested a very good crop of 346 tons as compared with 194 tons in 1948.

The flue-cured tobacco production by non-African growers in Iringa District was adversely affected by the drought and production dropped from 1,901,383 lb. in 1948 to 1,710,816 lb. in 1949.

Papain decreased appreciably in production and value and the continued low prices make prospects for papain remain unfavourable.

An increased area of tea is recorded, owing to increased planting in the Usambaras, but the dry season had a very unfavourable effect on production in the Southern Highlands tea estates.

Pyrethrum has remained at much the same level, but the improved tendency in price has stimulated renewed interest in this crop.

Sugar production remained at much the same level as last year.

The order of importance of the main plantation crops was the same as last year and the relative importance in value of exports of these crops is shown in the following statement :—

Crop		Quantity exported tons		Value £		Place in export trade
Sisal	...	132,514	...	11,111,232	...	1
Coffee	...	12,040	...	1,480,768	...	2
Tobacco	...	1,073	...	217,536	...	3
Papain	...	119	...	91,804	...	4
Tea	...	427	...	69,700	...	5
Pyrethrum	...	141	...	26,150	...	6
Sugar	...	5	...	169	...	7

AFRICAN AGRICULTURE

Production of foodcrops, owing to the severity of the drought, was a failure in most areas despite the increased acreage planted, and it was necessary to import substantial quantities of foodstuffs to meet the deficiencies.

A plan designed to increase cotton and foodcrops in the Lake Province by the application of improved agricultural methods was inaugurated during the year. European and African staff to implement this plan have been recruited and this staff will concentrate their work in a much more intensive manner than has hitherto been possible.

Mechanization trials were initiated during the year in the Eastern Province to try out the technique and economics of mechanized rice and sorghum cultivation in co-operation with local native authorities and African cultivators under local conditions.

The production of cash crops by Africans, as in the case of plantation crops produced by non-African estates, was not so seriously affected by the drought as was the case with foodcrops. The weather had an adverse effect on the African-grown coffee crop in the Northern Province but the Bukoba crop was very good. Cotton production in the Lake Province, although considerably less than in the previous year, was fair considering the severity of the drought in Sukumaland. Fire-cured tobacco production exceeded the previous year's high level. Copra production was more than double the average output.

Most provinces report slow but sure advances in the long term campaign to improve African Agriculture, more especially in the efforts to increase production without increasing the area under cultivation.

GRADING AND MARKETING OF PRODUCE

The Department of Grain Storage is responsible for the marketing of African staple foodstuffs which come under price and distribution control. The staple foodcrops concerned are maize, sorghum, millets, rice, mixed beans and cassava.

The sisal crop, which during the war and post-war years was marketed through the Sisal Controller on behalf of the Board of Trade, was available for sale on the free market from 1st January, 1949.

The formation of the Tanganyika Sisal Marketing Association (TASMA) which deals with a very substantial proportion of the output, must be recorded as an important development. The trend of prices throughout the year continued upwards and the average price per ton for No. 1 Grade was £92 f.o.b. as compared with £88 9s. per ton in 1948.

The "mild" coffee crop grown in the Northern and Tanga Provinces and the Mbeya District of the Southern Highlands Province was cured by the Tanganyika Coffee Curing Company, Moshi, and marketed under the five-year contract with the Ministry of Food. The 1948/49 coffee crop was the second crop to be disposed of to the Ministry of Food under the contract. The African- and estate-grown crops were bulked together and sold under one schedule. In view of the steady rise in the world price for coffee, representations have been made for a revision of the contract before disposal of the 1949/50 crop.

The Bukoba Native Coffee Board continued to deliver its contract quota of "hard" coffee to the Ministry of Food, selling the remainder at the Mombasa coffee auctions at the enhanced prices caused by a combination of the effects of devaluation and a world shortage of coffee. The Department maintained a coffee grading service for this crop at Bukoba.

Further progress was made with the scheme to reorganize the Bukoba Coffee growing industry under the control of the Bukoba Native Coffee Board, although some delays were encountered. However the machinery for the hulleries to be erected in the marketing zones has arrived and it is expected that the first hullery will be erected in 1950. A Field Officer and African staff are now employed by the Board and each coffee zone has its own African representatives who are in contact with the Manager of the Board.

The Southern Highlands Province coffee crop, grown in the Mbosi area of Mbeya District and in the Rungwe District, was sold by the producers through the Mbosi Planters' Association and the Rungwe Growers' Co-operative Society respectively.

There was no change in the arrangements for the disposal of the cotton crop, which was exported to the United Kingdom and India under contract by bulk sales. The price paid to producers was the same as in 1948, namely: twenty-four cents per pound for first quality seed cotton in the Lake Province and fifty-nine and a half cents per kilo first quality in the Eastern Province and elsewhere in the Territory.

Part of the Iringa flue-cured tobacco crop was again disposed of to the tobacco factories in East Africa and the balance of the crop was sold through the Southern Highlands Non-Native Tobacco Growers' Union for export. This is an organization of the growers who have combined themselves into a marketing company having the sole agency for the disposal of the crop.

The Nyamirembe Native Tobacco Board, which markets the fire-cured crops of Biharamulo, Ngara and Kibondo Districts, entered into a three-year contract for the sale of the tobacco under its control at the same price as was paid last year.

The Ngoni-Matengo Co-operative Marketing Union is the Agency through which all the African-grown fire-cured tobacco from the Songea District is sold for the Songea District Native Tobacco Board. Most of this crop was exported to the United Kingdom where a regular outlet for Songea tobacco has been built up.

The sale of copra is controlled by market by-laws at Government and Native Authority markets and supplies of coconut oil and copra cake are subject to distributional and price control.

The Muheza orange crop was marketed by the appointed Agents of the Native Authority, following the usual practice, and disposed of partly as fresh fruit and partly in the form of orange juice.

Where Native Authority produce markets are in operation, assistance was given by the Agricultural Field Staff in the running of the produce market and these markets continued to function satisfactorily.

LOCUSTS

The locust situation remained quiet and no reports of swarms, hopper bands or egg-laying were received during the year from any part of the Territory outside the permanent Red Locust breeding grounds.

Reports from the Red Locust Control Service indicate that the position in the Rukwa Valley continues very satisfactorily. Scouting and control measures have been maintained during the dry season and preparations made for any necessary operations next season against Red Locust in the outbreak areas of Rukwa and Malagarasi.

PESTS AND DISEASES

Cotton pests were not serious in any of the cotton-growing areas and all cotton pests were fewer in number than usual throughout the season.

A serious outbreak of a scale insect on Cassava, which occurred in the Lake Province, was the subject of a special investigation by the Entomologist, Morogoro.

The Sisal Weevil (*Scyphophorus acupanatus*) was much less troublesome than in former years and it was possible to establish newly planted sisal without undue losses of transplants. Control of the weevil by biological methods is in progress and releases of three predators of the Banana weevil (*Cosmopolites sordidus*) received from Trinidad continue.

The white stem borer was the most serious coffee pest during the year, the dry conditions being suitable to its development. The success of DDT spraying for *Antestia* control was most encouraging, and as a result of the successful tests in Bugufi, DDT spraying on a large scale was undertaken.

Army worms caused serious damage to crops and grazing in the Western Province in January and in the Lake, Central and Northern Provinces in March and April, but the attack died down with the onset of the rains.

Important diseases identified during the year were the virus disease Woodiness of passion fruit vines, and Bud rot of pyrethrum. Also newly recorded were: the virus disease Pelargonium Leaf-curl, a bacterial leaf and petal spotting of Zinnia, and Rust in Aloe.

The reports of the Plant Pathologist, and of the Entomologists, Lyamungu and Morogoro, are included in Section V of this report.

AGRICULTURAL EXPORTS, 1949

The total quantity of the main agricultural products exported from the Territory was greater in 1949 than in the previous year and the total value was considerably higher.

Comparative figures of the principal agricultural exports which are given in Appendix II are summarized as follows :—

Year			Total amount Tons		Total Value £
1948	...	...	170,451	...	12,850,137
1949	...	...	176,726	...	16,379,752

The main increases in quantity and value were accounted for by the important economic crops sisal, cotton, coffee and tobacco. The value of sisal alone increased from £8,930,461 to £11,111,232.

Other important increases were copra from 48 tons valued at £1,472 to 3,585 tons valued at £164,313 and sunflower from 2,398 tons valued at £72,850 to 5,228 tons valued at £163,951.

Papain exports, which by weight were only eleven tons less than last year, decreased in value by £104,206, and the revenue was less than half the previous year's.

Other significant decreases occurred in groundnuts, sesame, gums and grain, the production of which was reduced by the unfavourable season.

NOTES ON MAIN CROPS

Sisal

The total rainfall for the year in the main sisal-growing areas was well below average but sisal withstood the extremely dry conditions fairly well. The Senior Research Officer, Sisal Experimental Station, reports that the total rainfall at Ngomeni for the year was about half the average and amounted to only 23.98 inches. While wilting was not excessive it is reported that the unfurling rate of new leaves was markedly reduced from about four leaves per plant during the month of July to approximately two leaves per plant in December. The drought greatly hampered planting and with the failure of the short rains hardly any planting could be done during the second half of the year and these conditions may have some effect on future output.

As a result of the increased area previously planted, the Territory again broke previous records. The 1949 production exceeded that of 1948 by 1,674 tons. The higher prices during the year in conjunction with the increased area made the value of exported sisal £2,180,771 greater than the value of the 1948 exports. The production, exports and value of sisal for the last five years is as follows :—

Year		Production Tons		Exports Tons		Value £
1945	...	112,218	...	110,637	...	3,068,744
1946	...	106,808	...	111,521	...	3,916,405
1947	...	105,552	...	95,856	...	5,469,443
1948	...	120,622	...	117,092	...	8,934,461
1949	...	123,196	...	132,514	...	11,111,232

Production since 1900 has increased as follows :—

Year	Production Tons
1900	750
1910	7,000
1920	16,600
1930	50,000
1940	120,000
1949	123,196

The quantity produced by Provinces was :—

	1946 Tons	1947 Tons	1948 Tons	1949 Tons
Tanga and Northern Provinces ...	60,609	60,599	68,464	72,249
Eastern and Central Line ...	36,075	33,839	38,447	39,737
Southern Province ...	10,124	11,114	13,711	11,210
	<u>106,808</u>	<u>105,552</u>	<u>120,622</u>	<u>123,196</u>

The Sisal Experimental Station is financed from funds provided by the Sisal Board which are derived from a cess on the production of sisal fibre. The station is operated by the Department of Agriculture in collaboration with the Research and Mlingano Management Committee appointed by the Tanganyika Sisal Growers' Association. Officers posted to the station comprise a Senior Research Officer, a Plant Physiologist and two Agricultural Assistants. During the year it was not possible to fill vacancies on the staff for three scientific workers, an agricultural officer and a secretary-librarian, largely owing to difficulties of recruitment arising out of a post-war shortage of trained men. The representative of Messrs. Plant Protection, Ltd., Yalding, Kent, was a visiting worker on the station for three months when he carried out studies in connection with the sisal weevil.

The approved scheme for extending sisal research involved a large building programme. Five houses, three laboratories and a block of offices are now under construction in accordance with plans and specifications drawn up on the station, and these buildings should be ready by the middle of 1950. A considerable quantity of scientific equipment has either arrived or is on order for the laboratories.

Details of the field trials, experiments and entomological investigations being carried out at the Sisal Experimental Station are given in Section II of this report.

Coffee

The total exports for 1949 were 12,040 tons as compared with 11,259 tons in 1948 and 13,858 tons in 1947. Production of the 1948/49 crop of mild coffee in the Northern Province was adversely affected by the prolonged drought. The increase in exports is accounted for by the heavy crop of hard coffee harvested in Bukoba District where the climatic conditions were more favourable for coffee production in 1949.

The estimated production of coffee in the main coffee-growing areas in 1949 compared with the total in 1948 in each Province was as follows :—

Province	Area	African Grown			Estate Grown			Total	Total		
		Arabica		Robusta	Arabica			1949 Tons	1948 Tons		
Northern :											
	Moshi	...	3,216	...	—	...	830	...	4,046	...	5,605
	Arusha / Mbulu	...	183	...	—	...	471	...	654	...	1,459
Lake :											
	Bukoba	...	2,015	...	5,455	...	—	...	7,470	...	6,138
Southern Highlands :											
	Mbosi / Rungwe	...	374	...	—	...	346	...	720	...	402
	Total	...	5,788	...	5,455	...	1,647	...	12,890	...	13,604

Small quantities of coffee are produced in the Usambaras, Tanga Province, in Morogoro District, Eastern Province, and in Songea District, Southern Province, amounting in all to some 300 tons annually. This coffee is disposed of in the local market or exported under licence if not required for local use.

African-Grown Coffee

The Northern Province African-grown crop was 3,399 tons as compared with 4,429 tons in 1948, the reduction being due to the effects of the drought. 3,216 tons of this were produced in Moshi District. The Moshi Native Coffee Board has completed its fourth successful season. The Kilimanjaro Native Co-operative Union Coffee Training School was officially opened on 9th January, 1949, and thirty pupils were enrolled during the year.

Production of African-grown coffee in the Northern Province in tons during the past five seasons was as follows :—

1944/45		1945/46		1946/47		1947/48		1948/49
4,080	...	3,196	...	2,479	...	4,429	...	3,399

A good crop of coffee was harvested in Bukoba and exports increased from 6,138 tons in 1948 to 7,470 tons in 1949.

Quantities marketed in tons during the five-year period 1945 to 1949 were as follows :—

	1944		1945		1946		1947		1948		1949	
	Tons		Tons		Tons		Tons		Tons		Tons	
Arabica	...	3,987	...	2,135	...	1,207	...	2,637	...	1,140	...	2,015
Robusta	...	5,434	...	5,970	...	3,363	...	5,813	...	4,998	...	5,455
Total	...	9,421	...	8,105	...	4,570	...	8,450	...	6,138	...	7,470

The Bukoba Native Coffee Board bags, grades and markets the whole of the African-grown coffee crop of the Bukoba area.

Estate Coffee

The following table shows the production of the estate coffee for the past five years in the Northern and Southern Highlands Provinces :—

Year	Northern Province		Southern Highlands Province		Total
	Tons		Tons		Tons
1944/45	...	2,558	...	305	2,863
1945/46	...	2,992	...	60	3,052
1946/47	...	827	...	283	1,110
1947/48	...	2,635	...	194	2,829
1948/49	...	1,301	...	346	1,647

The general standard of management of coffee estates in the Northern Province has improved in recent years, but the 1948/49 crop was below expectations, being adversely affected by the drought. The Southern Highlands coffee estates which are mainly limited to a small area at Mbosi, Mbeya District, were more favoured by the weather in 1949 and produced an excellent crop.

Cotton

The Lake Province cotton crop was 37,361 bales as compared with 45,387 bales the previous year. In Sukumaland where the bulk of the Lake Province cotton crop is produced the planting rains were brief and intermittent, followed by a drought from January to March. The rains in April were sufficient only for a fair crop of cotton to be harvested.

The Eastern Province produced 12,579 bales in 1949 as compared with 6,079 bales in 1948. The good prices stimulated a demand for seed for planting and good yields were secured in all areas except Rufiji.

A most important factor was the low incidence of the American Boll Worm and other insect pests, which must be attributed to the dry conditions.

The small production in the Southern Province increased from 148 bales in 1948 to 304 bales in 1949, while the combined crop of the Northern and Tanga Provinces decreased from 1,089 bales in 1948 to 1,064 bales in 1949.

The production of lint in bales of 400 lb. in the various Provinces compared with the average production for the period 1939 to 1949 is shown in the following statement :—

Province				1939/1949 Average	1949
Lake	...	...	...	35,429	37,361
Eastern	...	...	...	10,727	12,579
Tanga	...	...	...	1,590	666
Southern	...	...	...	801	304
Northern	...	...	...	610	398
Total				49,157	51,308

Good progress is being made with the multiplication of U.K. 46 cotton seed which will replace the present commercial cotton, Mz. 561, of the Lake Province. U.K. 46 was first issued in the 1946/47 season and the 1,070 tons available for planting in the 1949/50 season should produce enough seed to distribute throughout the cotton areas of the Lake Province in the 1950/51 season. U.K. 46 has good Jassid resistance, gives higher seed cotton yields and a more satisfactory ginning percentage than Mz. 561.

Parallel to the work being done with U.K. 46, another strain U.K. 48, resistant to Blackarm disease, is being multiplied to succeed U.K. 46. Twenty-one tons of U.K. 48 are available for planting in the 1949/50 season.

Groundnuts

The African-grown crop in the Western, Lake and Central Provinces which are the main producing Provinces was very poor. This crop is grown for food supplies and for the local consumption of groundnut oil, but after local requirements are met the surplus is sold for export.

The estimated production and exports in tons since 1946 are :—

		1946		1947		1948		1949
Production	...	14,140	...	21,200	...	16,750	...	10,880
Exports	...	475	...	3,534	...	3,129	...	838

The maximum amount exported prior to 1949 was 22,786 tons in 1936, but since the war, production of most of the African-grown crop is required for local consumption.

The Overseas Food Corporation continued preparations for large scale production of groundnuts, together with other crops which would be suitable for a rotation, at Kongwa, Urambo and Nachingwea.

Sunflower

Sunflower withstood the drought fairly well. The Western and Lake Provinces' production was lower than anticipated, but production was good in the Southern and Southern Highlands and Northern Provinces. 5,228 tons were exported in 1949 as compared with 2,298 tons in 1948. Further expansion of the African-grown crop is not anticipated as the price has not been guaranteed in 1950, but large areas have been included in this year's planting programme of the Overseas Food Corporation.

Sesame

The quantity exported dropped from 928 tons in 1948 to six tons in 1949. The Southern Province, where most of the sesame is grown, produced only a moderate crop and because of the Territorial shortage of food supplies practically the whole of the crop was milled locally.

Rice

The paddy crop on the flats of Lake Nyasa in the Rungwe District, Southern Highlands Province, and in the Kilombero valley, Eastern Province, was good and in the Southern Province fair. Elsewhere in the Territory the crop was a failure except in a few favoured localities in the Lake and Western Provinces.

The recorded sales of paddy amounting to 9,373 tons as compared with 18,312 tons in 1948 and 27,605 tons in 1947 were as follows :—

Province		1947		1948		1949
Lake	...	8,200	...	7,660	...	1,293
Eastern	...	6,444	...	2,556	...	2,270
Western	...	3,933	...	1,982	...	222
Southern	...	3,586	...	1,598	...	1,291
Southern Highlands	...	3,382	...	2,475	...	3,670
Tanga	...	2,000	...	2,017	...	624
Central	...	60	...	24	...	3
		27,605	...	18,312	...	9,373

Wheat

The Northern Province wheat crop was a record one despite the weather. In the drier areas the crop was a failure, but in other parts of the Province the rainfall was sufficient to produce a moderate to good harvest.

Production since the Wheat Scheme was closed in 1947 is mainly from the estates in the Moshi, Arusha and Mbulu Districts and the following statement gives comparative figures since 1947 :—

	1947	1948	1949
	Tons	Tons	Tons
Estate-grown	1,985	3,326	4,439
African-grown	274	336	111
Wheat Scheme	2,267	—	—
	<u>4,526</u>	<u>3,662</u>	<u>4,550</u>

Wheat is produced in Ufipa District, Western Province, in the Southern Highlands Province and in the Songea District, Southern Province.

The quantity of wheat marketed in these areas compared with the crop of the Northern Province is as follows :—

	1947	1948	1949
	Tons	Tons	Tons
Northern Province	4,526	3,662	4,550
Western Province	51	221	64
Southern Highlands Province	50	98	95
Southern Province	620	420	425

Maize, Millets and Sorghums

The year 1947 produced a bumper harvest of maize, millets and sorghums; 1948 produced an average harvest; but the drought of 1949 reduced the production of grains in the Lake, Western and Central Provinces to a very low level.

Fortunately the Southern Province produced a good average harvest of African staple foodcrops with a substantial surplus of sorghums and maize for marketing. There was a good crop of maize in the mountain areas of the Northern and Southern Highlands Provinces, but elsewhere the crop varied from fair to negligible.

The following statement shows the recorded sales of surpluses sold in 1949 compared with the previous two years :—

	1947	1948	1949
	Tons	Tons	Tons
Southern	14,821	4,301	10,671
Eastern	13,680	10,438	2,531
Northern	11,314	17,196	8,225
Southern Highlands	8,002	8,564	5,205
Central	7,235	1,000	231
Tanga	6,425	7,200	—
Lake	4,200	3,565	872
Western	3,835	5,009	1,107
Total	<u>69,512</u>	<u>57,273</u>	<u>28,842</u>

Copra

The production and exports of copra in tons for the last three years were :—

	1947	1948	1949
	Tons	Tons	Tons
Production	5,448	8,259	16,286
Exports	40	48	3,585

The high production is attributed to a satisfactory setting of the flowers following the favourable weather conditions the previous season, enhanced prices and greater interest in producing good quality copra; and acknowledgment must be made of the results of the work of Agricultural Assistants and African field staff in the coastal districts who were engaged on a campaign for the cleaning up of coconut plantations.

The production of each coastal Province was as follows :—

				Tons
Eastern	...	...	...	9,388
Tanga	...	...	...	5,147
Southern	...	...	...	1,751

The production of the Eastern and Southern Provinces was more than double the previous year.

Tea

The total area of tea in the Usambara Mountains, Tanga Province, and in the Rungwe and Mufindi areas of the Southern Highlands Province is estimated at 8,650 acres as compared with 8,313 acres in 1948. Production of made tea was 1,453,132 lb., a decrease from last year's total which was 1,491,408 lb.

It was a most unsatisfactory year for tea, a crop which needs a high rainfall or misty conditions during a large part of the year if plucking is to go forward steadily. The dry weather of 1949 severely cut down the flush of leaf and although new areas came into bearing in the Usambaras and improved the output there, the unfavourable conditions in the Southern Highlands brought the total production down below the level of the previous year.

A comparison of production figures since 1945 is as follows :—

	1945		1946		1947		1948		1949	
Usambaras	...	398,000	...	339,192	...	342,000	...	323,260	...	452,000
Mufindi	...	559,243	...	671,267	...	573,957	...	599,723	...	536,492
Rungwe	...	320,471	...	470,460	...	454,557	...	568,426	...	464,640
		<u>1,277,714</u>		<u>1,480,919</u>		<u>1,370,514</u>		<u>1,491,409</u>		<u>1,453,132</u>

Tea exports since 1945 were :—

	1945		1946		1947		1948		1949	
	Tons		Tons		Tons		Tons		Tons	
Quantity exported	...	...	...	400	...	625	...	446	...	462

Sugar

Production at the factory of the one estate producing white sugar in the Northern Province was higher than that of the previous five years and comparative figures are as follows :—

	1945		1946		1947		1948		1949	
	Tons		Tons		Tons		Tons		Tons	
Refined Sugar	...	...	...	6,854	...	7,250	...	7,202	...	5,860
Unrefined Sugar	...	...	...	450	...	400	...	304	...	228

Elsewhere in the Territory "Jaggery" or unrefined brown sugar is produced at a number of small scale presses to meet the local demand for this product. Production of "Jaggery" is estimated at 4,000 tons.

Tobacco

Production of flue-cured and fire-cured tobacco for the five year period 1945 to 1949 was as follows :—

	Iringa District Flue-cured lb.	Songea District Fire-cured lb.	Biharamulo Area Fire-cured lb.
1945	... 1,537,903	... 351,680	... —
1946	... 1,027,164	... 585,860	... 107,200
1947	... 749,389	... 389,740	... 179,200
1948	... 1,901,383	... 1,341,760	... 291,200
1949	... 1,710,816	... 1,989,120	... 321,942

Flue-cured Tobacco.—Production in the Iringa District was adversely affected by the drought but the crop was moderately good considering the season. The overall average price was Shs. 1/50 per lb. compared with Shs. 1/40 per lb. last season. Grade I leaf was sold at Shs. 2/70 per lb. 663,636 lb. were graded and processed for sale for local manufacture and 1,037,280 lb. for export.

Fire-cured Tobacco.—Further progress is recorded in Songea District, where weather conditions were more favourable and with increased planting the crop was the highest recorded.

The Nyamirembe fire-cured crop which is produced in the Biharamulo, Ngara and Kibondo Districts continued to make further progress under the control of the Nyamirembe Native Tobacco Board, and there is an improvement in quality. Average prices rose from 92 cents to 96 cents per kilo. The production of Kibondo District was outstanding. The quantity marketed increased to 80,540 lb. from 9,960 lb. last season, when organized production first started in this District.

Roll Tobacco.—The production of roll tobacco in the Eastern, Tanga and Southern Provinces was estimated to be 398,720 lb. in 1949. The average annual production of this type of tobacco is 672,000 lb. approximately.

Nicotiana Rustica.—High nicotine content tobacco produced in the Southern Highlands gave variable yields and the market was uncertain.

Pyrethrum

Production over the past five years is as follows :—

	1945 Tons	1946 Tons	1947 Tons	1948 Tons	1949 Tons
Northern Province	306	298	204	101	91
Southern Highlands Province	391	370	303	154	377
	697	668	507	255	468

Production in the Northern Province declined slightly but the improved tendency in price has stimulated replanting. The renewed interest in the Southern Highlands Province last year brought production from that area to more than double that of the previous year.

Papain

The exports of papain were 119 tons valued at £91,801 as compared with 130 tons valued at £195,007 in 1948 and 109 tons valued at £308,485 in 1947.

Seed Production

The production of seed beans in Arusha District has developed into an important industry. Production for export since 1945 is as follows :—

				Tons
1945	...	...	...	540
1946	...	...	...	534
1947	...	...	...	549
1948	...	...	...	1,665
1949	...	...	...	1,267

The 1949 crop was a satisfactory achievement in the face of the drought and it is considered that growers who have established a reputation are likely to maintain and possibly increase their business.

One hundred and seventy-one tons of seed peas were produced for export in the Northern Province as compared with sixty-three tons in 1948.

There is a possibility of the production of seed peas being developed in the Southern Highlands Province where a limited quantity of flower and vegetable seeds are produced for export.

Onions

The Northern Province crop was the highest since 1944, being 2,293 tons as compared with 2,085 tons the previous year. Substantial quantities are produced in other Provinces, particularly Eastern, Central and Western Provinces, to meet local demand. Five tons of onion seed were imported from India during the year for resale to onion growers.

MINOR CROPS

Cinchona

Several estates in the Usambaras are planted with cinchona. Production over the last five years was as follows :—

1945 Tons		1946 Tons		1947 Tons		1948 Tons		1949 Tons
71	...	92	...	49	...	68	...	89

Derris

This crop has declined in recent years. Production over the past five years was :—

1945 Tons		1946 Tons		1947 Tons		1948 Tons		1949 Tons
39	...	44	...	15	...	9	...	10

Essential Oils

Bitter orange, geranium and lemon grass oil are produced in the Northern and Tanga Provinces on a commercial scale, and on an experimental scale in the Southern Highlands Province.

The exports of essential oils during 1948 and 1949 were as follows :—

			1948				1949	
			Quantity lb.		Value £		Quantity lb.	Value £
Lemon grass oil	...	24,725	...	7,180	...	8,683	...	4,224
Bitter orange oil	...	2,592	...	1,904	...	4,392	...	2,669
Geranium oil	...	—	...	—	...	550	...	838
Others	...	167	...	116	...	101	...	275

Condiments

Tanga Province produced 1 ton of black pepper and 2 tons of chillies as compared with 2.4 tons black pepper and 5.5 tons chillies in 1948 and 2.3 tons black pepper and 5.75 tons chillies in 1947.

Palm Oil

The African Kigoma palm kernel industry in the Western Province maintained the progress made in recent years. Exports of kernels since 1946 when this trade was revived were :—

				1946 Tons		1947 Tons		1948 Tons		1949 Tons
Palm Kernel	...	...	...	10	...	192	...	263	...	239

The quantity of pericarp oil marketed for consumption in Tanganyika was 26 tons as compared with 11.9 tons the previous year and 34.4 tons in 1947. The increase is due to a higher price.

Tanga Province produced 30 tons of palm oil as compared with 27 tons in 1948 and 25 tons in 1947.

A ten-acre nursery and plantation has been established at Kigoma with Congo pedigree oil palm seed as a source for future seed supplies.

Tung Oil

There is one tung oil estate in the Usambaras; and at the higher elevations in the Southern Highlands Province the crop is on trial.

Cocoa

Production from the one estate which is interested in this crop amounted to 5 tons as compared with 3 tons the previous year and 2.85 tons in 1947.

Cashew Nuts

This crop, which is suited to the coast, is produced in commercial quantities in the Southern Province and in Kiserawe District and Mafia Island, Eastern Province. There has been a marked increase in planting of cashew trees as a result of the increase in price, but the effect of the recent planting will not be felt for some time. The 1949 production was smaller than last year because of the low rainfall. The Southern and Eastern Provinces sales in tons since 1945 were as follows :—

Province		1945		1946		1947		1948		1949
Southern	...	3,971	...	1,900	...	1,312	...	4,533	...	3,276
Eastern	...	347	...	281	...	348	...	661	...	449
Total	...	4,318	...	2,118	...	1,660	...	5,194	...	3,725

Most of the crop is exported to India for processing before being sent to America where there is a big demand.

Kapok

Production in the Tanga and Eastern Provinces since 1946 is estimated in tons as follows :—

		1946		1947		1948		1949
Eastern Province	...	220	...	220	...	200	...	355
Tanga Province	...	152	...	62	...	80	...	60
		372	...	282	...	280	...	415

Beeswax and Honey

Following the exceptionally good year of 1948 for honey and beeswax the year 1949 was very poor as the scanty rains resulted in a short flowering season.

Exports for the past five years were :—

Year	Beeswax				Honey				
	Tons		Value		Cwts.	Value			
1945	...	...	795	...	£132,297	...	3,045	...	£5,690
1946	...	...	732	...	£189,733	...	1,701	...	£4,078
1947	...	...	410	...	£131,136	...	2,363	...	£7,242
1948	...	...	905	...	£261,356	...	4,779	...	£12,959
1949	...	...	525	...	£150,503	...	751	...	£1,896

Gums (Arabic and Copal)

The export of gums was considerably lower than usual. The reduction is attributed to the drought which reduced exudation, and the shortage of water possibly restricted the movement of gum collectors in the gum arabic areas of the Central and Western Provinces.

The following are the exports since 1944 :—

Year	Tons			Value £	
1944	...	...	2,567	...	114,657
1945	...	...	1,712	...	107,274
1946	...	...	1,540	...	91,962
1947	...	...	1,554	...	85,583
1948	...	...	1,490	...	78,350
1949	...	...	878	...	43,798

One hundred and sixteen tons, valued at £5,351, of the above exports in 1949 were gum copal.

Rubber

Production of Para rubber, which is confined entirely to one estate in the Eastern Province, was 35 tons as compared with 50 tons in 1948 and 45 tons in 1947. The dry weather restricted production.

Castor Seed

Production has steadily risen since 1945 but the drought affected the 1949 crop. Comparative outputs since 1945 from the Eastern and Central Provinces in tons are :—

		1945		1946		1947		1948		1949
Eastern Province	...	268	...	342	...	698	...	850	...	690
Central Province	...	160	...	94	...	306	...	473	...	333
		428	...	436	...	1,004	...	1,323	...	1,023

This crop is suited to the drier parts of Kilosa District, Eastern Province, and to the Kongwa District, Central Province, adjacent to the Kilosa producing areas, and is becoming a useful cash crop to the people of these areas. 61 tons castor seed were exported from Lindi in 1949 as compared with 19 tons in 1948, and 38 tons were exported from Mbulu District, Northern Province.

ROOT CROPS

Cassava

The food shortage has shown clearly the value of the cassava crop as a reserve against famine. Considerable inroads were being made into these reserves at the end of the year when food supplies began to run out, and a great deal of propaganda and preparation for replanting has been undertaken. The quantity of cassava surplus to local requirements for sale in the Southern Province was lower than last year and dropped from 18,619 tons in 1948 to 6,041 tons in 1949. 5,861 tons of this surplus were transported to help to meet deficiencies of food supplies in other provinces.

Sweet Potatoes

The severe drought killed out much of the planting material but large areas were planted as an additional food reserve and this crop was a valuable asset in areas suitable for its cultivation.

European Potatoes

Good crops were again harvested in the Southern Highlands Province, and the crop was unusually free from late blight because of the absence of the humidity which favours that disease. 1,119 tons passed through the produce markets as compared with 958 tons in 1948, 618 tons in 1947 and 244 tons in 1946.

The dry weather reduced yields in the Usambaras, Tanga Province.

The work of testing varieties for blight-resistance recommenced at Kunguli farm, Lushoto, in 1949.

LEGUMES

Although the quantity of mixed beans produced was higher than last year there was a shortage of legumes in many areas. The Southern Province and Bukoba District supplied appreciable quantities to other areas in short supply. The cultivation of the soya bean in Bukoba District has extended to an important degree and the chick pea crop in the Lake Province continues to be very popular.

Some 12,365 tons of mixed legumes passed through the Provincial produce markets as compared with 10,637 tons in 1948 and 14,657 tons in 1947.

The surplus quantities sold through produce markets in each province were as follows :—

Province	Mixed Beans	Mixed legumes	Harri-cot Beans	Chick Peas	Cow Peas	Gram	Pigeon Peas	Soya Beans	Bam-barra
Northern	640	—	—	—	—	—	—	—	—
Tanga	50	—	—	—	—	—	—	—	—
Central	0.8	—	—	0.1	1.7	0.3	0.1	—	—
Lake	2,004	—	—	3,553	459	—	—	844	—
Southern	—	—	—	—	3,128	—	—	—	—
Western	685.3	11.7	6.3	23.2	28.8	3	46.8	—	3.9
Southern Highlands	213	6.2	—	—	77	—	—	—	—
Eastern	263	—	—	—	174	47	95	—	—
Total	3,856.1	17.9	6.3	3,576.3	3,868.5	50.3	141.9	844	3.9

VEGETABLES AND FRUITS

The production of vegetables has increased substantially in recent years and progress was maintained in spite of reduced rainfall. To assist production supplies of seed are arranged and markets organized in the main producing areas.

Vegetables grown in the Usambaras are marketed in Tanga. Production was 361 tons in 1947, 512 tons in 1948 and 475 tons in 1949. This year's crop was reduced by the drought. Vegetable seed valued at over £200 was sold to African growers through the Agricultural Officer.

Production in Morogoro and Kilosa Districts has increased from 724 tons to 965 tons per annum in the last five years to meet the demand from Dar es Salaam.

The Southern Highlands production from which supplies were sold to Kongwa, Lindi and Dar es Salaam, amounted to 836 tons as compared with 966 tons in 1948 and 260 tons in 1947. It is of interest to note that a big proportion of the Southern Highlands vegetable crop was transported to consuming centres by air.

Experimental growing of vegetables at Mahiwa, Southern Province, was carried out successfully and it is hoped to extend production.

Citrus

The Muheza citrus industry had a moderate year, the orange crop reacting severely to the dry conditions which reduced the size of the fruits and the juice content. Fresh oranges were sold very largely in Kenya and the juice was as formerly taken by cordial manufacturers in Nairobi.

A comparison of production of oranges and juice since 1945 is as follows :—

Year			PRODUCTION	
			Oranges Tons	Juice Gallons
1945	...	...	1,496	—
1946	...	...	1,184	—
1947	...	...	793	3,020
1948	...	...	1,546	16,390
1949	...	...	1,204	15,935

Passion Fruit

Passion fruit production on a commercial scale is being developed near Lushoto, Tanga Province, and although the 1949 crop was not up to expectations because of the dry season this new activity shows promise of success. The estate and factory concerned hope to obtain supplementary supplies of passion fruit from African cultivators who have been encouraged to plant the vines within economic range of marketing centres.

SECTION II.—WORK OF THE DEPARTMENT OF AGRICULTURE.

DETAILS OF ASSISTANCE AND PROGRESS OF FIELD EXTENSION ACTIVITIES

The establishment of Agricultural Officers was increased from 53 to 55 and Agricultural Assistants from 36 to 57 in 1949 and during the year the vacancies for 8 Agricultural Officers and 12 Agricultural Assistants were filled. At the end of the year however, the Department was still 18 Agricultural Officers and 17 Agricultural Assistants under establishment. The department is also

very short of senior and experienced officers for provincial duties, and there are in fact few who can claim more than two tours of service. In view of recent retirements of Senior Agricultural Officers it has been necessary to combine certain Provinces under one Provincial Agricultural Officer. The Northern and Tanga Provinces and the Eastern and Central Provinces were brought under the supervision of one Provincial Agricultural Officer for each pair during the year.

With the extension of mechanized farming the services of Agricultural Assistants with experience and training in the maintenance and use of Agricultural machinery have been in great demand and in future more officers with experience of mechanized farming will be recruited.

Provincial Liaison Committees composed of officers of the Natural Resources Departments and Field Officers of the Overseas Food Corporation were initiated in the Central, Western and Southern Provinces. The Committees will meet quarterly. The object of these Committees is to ensure that the experience of the officers concerned is pooled and that the Government Officers are fully conversant with the Corporation's plans and policy.

Meetings held at Kongwa in October, Urambo in September, and Nachingwea in September, were attended respectively by the Provincial Agricultural Officers, Morogoro, Tabora and Lindi. Successful meetings were held and many subjects of mutual interest discussed.

It is with regret that the death is recorded as a result of a motoring accident at Morogoro on the 7th December, 1949, of Mr. I. J. Davies, Agricultural Officer. Mr. Davies took up his appointment as recently as October, 1949, and this loss has deprived the department of a promising young Officer.

The Reports of each Provincial Agricultural Officer and of the Specialist Officers are included in Section V of this report and details of European Staff are given in Appendix I.

There are sixteen Asiatic Clerks employed by the Department and the African staff consist of :—

- 7 African Agricultural Assistants.
- 9 Coffee Grading Assistants.
- 91 Recorders.
- 19 Artisans.
- 682 Instructors, Junior Service.
- 505 Instructors, Food Production Staff.
- 30 Instructors, Copra Industry.
- 51 Overseers.
- 31 Motor Drivers.
- 13 Teachers.
- 36 Clerks, Junior Service.
- 24 Clerks, ungraded.
- 5 Surveyors.
- 65 Instructors on Probation.
- 44 Messengers.

The main increase in the African staff was under item Instructors from 447 in 1948 to 682 in 1949. This increase is to provide for the absorption of the instructors who have completed the course of training at the Ukiriguru

Instructors' School in the scheme to provide the Territory as early as possible with 1,000 African Agricultural Instructors. It is ultimately proposed to increase the establishment to 2,000 trained Agricultural Instructors.

The following sub-sections summarise the progress made in the various Provinces.

EASTERN AND CENTRAL PROVINCES

With effect from the 31st May the Provincial Agricultural Officer, Morogoro, assumed agricultural charge of the Eastern and Central Provinces, combined with an Agricultural Officer in Dodoma to whom the Agricultural staff of the Central Province were responsible. The drought brought famine conditions to the Central Province and localized crop failures to the Eastern Province. Outstanding crop increases in the Eastern Province were the record production of copra, good yields of cotton in Ulanga, Kilosa and Morogoro Districts, and the high production of sisal, the major plantation industry of the Eastern Province.

The Native Authority tractor ploughing scheme in the Rufiji is gradually expanding and mechanization trials with rice and sorghum were initiated by the Department in the Rufiji, Kilombero valley and Wami plains.

The organization of relief measures and a drive for the restoration of food production required the special attention of the staff in the Central Province.

With the co-operation of the Commissioner of Prisons and the Superintendent of Prisons, Kingolwira, good progress was made with the projected dairy scheme to supply Dar es Salaam with milk from the Kingolwira Prison Dairy Farm.

The Morogoro Farm has been expanded to meet the increasing demand for planting material and the tribal farms established at four centres in the Central Province served a useful function in providing seed, carrying out crop trials and demonstrating sound cultural methods.

WESTERN PROVINCE

The overall crop production was very poor and there were no outstanding crop increases in 1949. Crops which survived the drought best were bulrush millet, cassava and sunflower.

Excellent progress has been made reclaiming the fertile Luiche Valley near Kigoma. The work was supervised by the Agricultural Assistant, Kigoma, and money was voted for the work by the Native Treasury. The main obstructions have been cleared and the old river bed dug out and straightened.

The building of dams for irrigating rice lands continues and fifteen new dams were built in 1949.

Further developments at the Mwanhala Agricultural Station are the establishment of a demonstration peasant holding, and the building of a school for Native Authority personnel and selected African farmers.

Agricultural Assistants are in charge of the Agricultural Development centres at Kahama and Sumbawanga, which were established during the year.

LAKE PROVINCE

The areas east of the Lake experienced one of the worse seasons in recent years; west of the Lake rains were disappointing but no serious crop losses occurred. The drought was less severe around the Lake shore and the climatic conditions were favourable for the Bukoba coffee crop.

The grain crops were a failure in Sukumaland but cotton stood the drought well and yields varied from half to two-thirds of a normal year.

The multiplication of UK. 46 and UK. 48 cotton seed proceeds. 1,070 tons of UK. 46 seed are available for planting in 1949/50 in five Mwanza Ginnery Zones. Twenty-one tons of UK. 48 seed is available for planting in Bukumbikisu peninsula in Uzinza and on Kome Island.

£50,000 was allocated for capital and recurrent expenditure in the preliminary stages of a cotton and food production scheme which will be controlled by the Lake Province Cotton Board.

The new Agricultural Training School for African Instructors at Ukiriguru is nearly completed and twenty-five acres of farm land are attached to the school.

Very close contact continues to be maintained between the Provincial Agricultural Staff and the station staff of the Ukiriguru Experimental Station.

SOUTHERN HIGHLANDS PROVINCE

In spite of the unsatisfactory season the year was reasonably prosperous. African agriculture supplied the bulk of the needs of the Provincial food supplies and crop yields and markets of the estate-grown crops of tobacco, tea, coffee and pyrethrum were good.

Tobacco production was lower than last year but the variety "Ehlers", which is very disease-resistant, was a great boon to Iringa District.

There was renewed interest in pyrethrum production, coffee yielded an excellent crop, but climatic conditions were unfavourable for tea.

The paddy crop from Rungwe District was a good one but transport difficulties prevented the quick evacuation of the crop from the producing areas.

The production and consumption of wheat, potatoes and vegetables by Africans is becoming more widespread especially in the Mporotos Mountains, Mbeya District.

NORTHERN AND TANGA PROVINCES

The Provincial Agricultural Officer, Arusha, assumed agricultural charge of the Northern and Tanga Provinces in June. The year was not a very satisfactory one particularly in Tanga Province. The efforts of the sisal estates to produce sufficient food for employed labour were defeated by the drought, and surplus grain was supplied from the Northern Province to meet deficiencies.

The papain industry is declining; on the other hand sisal, coffee and pyrethrum are increasing and the seeds industry is progressing satisfactorily.

The Soil Conservation Service carried out demonstrations of bench terracing and narrow-base contour banking in Arusha District and broad-base terracing on several estates.

There has been considerable activity in the Tanga Province to increase copra production and improve the condition of coconut plantations.

The kilns and copra store for the Gombero Coconut Scheme were built during the year. This is a Native Authority Scheme for buying coconuts and manufacturing copra. Owing to the delays in building through shortage of water, it was only possible to carry out two months kiln work this year, but the two double kilns when working to full capacity will have a daily output of 6,000 nuts.

SOUTHERN PROVINCE

This Province fared better climatically than the remainder of the Territory. A good average harvest of African staple crops was secured, sufficient for local requirements and with exportable surpluses.

The Songea District tobacco crop was the highest recorded and further expansion of this industry is anticipated.

The Mahiwa Experiment Station, which originally was a rice station only, includes trials with other crops, investigation on animal husbandry problems, vegetable production and a nursery.

AGRICULTURAL STATIONS AND EXPERIMENTAL WORK : COFFEE RESEARCH STATION, LYAMUNGU, MOSHI

By the end of December, 1949, the harvesting of the coffee crop had not been completed and consequently detailed results of the field experiments are not available.

The year's rainfall, amounting to 32.30 inches, was the lowest on record for this Station. In what are generally considered to be normal seasons the rainfall at the station during the months of April and May exceeds twenty inches in each month. In such seasons June is also a cold, damp month. The effect of these conditions is to retard ripening of the crop and picking does not commence until August. In the 1949 season, however, the rainfall in April and May was 9.34 inches and 10.64 inches respectively. This very much lighter rainfall did not retard growth and ripening, and picking commenced at the end of May. Shortage of rain in the months of July, August and September delayed ripening of the later pickings.

The trials of selections using clonal material were extended by a further two and a half acres. Similar trials were planted in the Arusha, Usa River and Moshi Districts. In all, four Latin squares (six clones each) and three randomized blocks (four clones each) were planted.

Experiment XIX, designed to compare the growth and yield of *C. arabica*, on single stem and on multiple stem, in the presence and absence of both interplanted bananas and manure, was planted. This experiment covers 5.5 acres.

The number of cuttings rooted during the year was 14,079. The reduction from last year is largely due to re-organization of the mother-tree nurseries and consequent temporary falling-off of the number of cuttings available. In addition, greater discrimination in choice of clones for propagation has been shown. Mother-trees of some new selections were established.

Eight old frames of an inconvenient size were demolished and twenty-eight new ones were constructed. More of the old wooden-framed lights were replaced by steel ones; a total of sixty-four have now been so equipped and standardized. A start was made in the erection of a trial structure over the frames for the better control of light and shade.

Losses of rooted cuttings after potting-up still remained a problem; investigations into this continued.

Comprehensive experiments were laid down in the frames to cover the following points:—

- (1) Type and position of basal cut.
- (2) Rooting media, including materials, grades, mixtures and proportions.

Space was made available to enable the most important of these experiments to be laid out so that statistical analyses of the results are possible. It is hoped to obtain information regarding percentage number of cuttings rooted in each treatment, time to root, and rooting capacity of the respective clones.

Final results are not yet available, but the recording of one experiment revealed that the total number of cuttings (mean of all treatments) rooted in this experiment was 92.7 per cent over a period of twenty-four weeks. One hundred per cent rooting was recorded in three individual plots, and the best mean obtained for any one treatment was 97.5 per cent. This is a considerable improvement on previous rooting figures, and is an indication of what can be achieved.

The work on Lyamungu Coffee Estate, an area adjacent to the station and which was taken over in 1947, has been continued. The uprooting of unthrifty (deep planted) coffee was completed. Some fifteen and a half acres, which had a dense stand of shade trees, was cleared and the eradication of couch grass commenced.

The renovation of the thirty-one acres of old coffee which had been properly planted was continued and a fair crop set with the early December rains. The work of renovation consisted of careful pruning, thinning of shade trees, and eradication of couch. Approximately one quarter of this area was prepared for conversion to multiple stem.

Incidence of the White Stem Borer has increased and appears to be spreading northwards to parts of the station not formerly infested.

There was no out-break of Thrips in 1949.

Leaf-miner was serious in certain areas towards the end of the year.

Leaf disease (*Hemeleia vastatrix*) was serious in some areas especially in the nursery at the beginning of the year. Even the youngest plants in the nursery are now sprayed with Bordeaux mixture twice yearly as a routine practice.

The equivalent of approximately sixty tons of parchment coffee was harvested from 86.16 acres; this figure includes seed and samples. In addition about one ton of "buni" was collected. This is the heaviest crop so far obtained and brings the average yield per acre for the last three seasons to a little over ten cwts. of parchment to the acre per annum.

One thousand four hundred and forty-four pounds of seed from the high yielding selections were sold to planters and the Moshi Native Coffee Board.

Over 5,200 plot and tree samples were taken and prepared during the season. These will be analysed for out-turn (clean to cherry) and grade. Many will be submitted for liquoring tests.

The animal husbandry work of selecting on the basis of milk yields was continued at Lyamungu. The total milk yield for the year was 5,938 gallons being an average of $204\frac{3}{4}$ gallons per cow. The best lactation completed during the year was one of $363\frac{1}{2}$ gallons in 266 days.

A successful Planters' Day, organized by the Tanganyika Coffee Growers' Association, was held at the station on the 19th July. Some fifty members and guests of the Association attended. The full Annual Report of the Coffee Research Station is published separately.

MBOSI COFFEE SUB-STATION, SOUTHERN HIGHLANDS PROVINCE

Fire swept through the planted area and killed a large proportion of the trees in the selection trials which were planted in 1947.

Two additional experiments were planted, one being a spacing trial and the other an experiment designed to investigate the best methods of establishing young coffee under the Mbosi conditions. The treatments included "placement" of various phosphatic fertilizers.

The investigations into the suspected Boron deficiency of coffee in this area were continued. Analysis of leaf material from affected coffee trees in this area shows that the Boron content is only 11 p.p.m. as compared with 31 p.p.m. from similar material taken from Lyamungu.

The extension to the Sub-Station, acquired in 1948, is being developed.

SISAL EXPERIMENTAL STATION, MLINGANO, NGOMENI

The total rainfall for the year was about half the average and only amounted to 23.98 inches. Such prolonged dry weather constituted a drought of unprecedented severity. The drought greatly hampered the planting of new experiments and with the failure of the small rains hardly any planting could be undertaken during the second half of the year. The propagation of citrus trees was also heavily restricted especially as the station experienced an acute water shortage from July onwards when the dam dried out.

There are eighteen field trials in progress on the station besides four external trials sited on outside estates. These trials cover a number of aspects of sisal growing such as cultivation system, spacing, spacing combined with cutting, manuring and mulching, fallowing between cycles of sisal, inter-planting food crops, planting methods, insecticide trials, the manuring of bulbil nurseries and trials comparing selected agave hybrids. Some of the experiments date back to 1936 and the year under review has been marked by the appearance of banding disease and other nutritional disorders in plots which have carried sisal continuously and in addition have been kept clean weeded for the past thirteen years. Young sisal representing the third cycle on the same land has made relatively poor growth compared with that planted on land which had previously been rested under elephant grass (*Pennisetum purpureum*) for five years. The latter promises to be ready for its first cutting in about two years from the date of planting despite the drought and a high plant population, particularly that planted on ridges.

A complex "spacing $\times$ cutting" experiment, which yielded interesting results during its first cycle, was replanted this year and has made satisfactory progress so far. Another experiment incorporating various cutting systems imposed upon three levels of plant population is already showing considerable differences. Drastic but frequent cutting, beginning at eighteen months from planting, of plots having a population of 6,000 plants per hectare produced the greatest amount of leaf, while postponement of the initial cutting until three years in plots having only 4,000 plants per hectare has led to the development of massive plants bearing long heavy leaves; this has been accompanied by a high loss of the lowest leaves through natural withering, and early poling may be expected. All the other treatments are about mid-way between these two extremes.

The factorial manurial trial which ended in 1949 with negative results was replanted on the double-row system in July. Dressings of nitrogen, phosphate, potash and calcium were made but much heavier rates of application were used in an endeavour to obtain responses to the fertilizers. Organic manures such as sisal waste, cotton seed, coconut cake, and elephant grass trash were applied to plots in the mulching trial. These recent experiments are not yet advanced enough to show any measurable differences. The bulbil nursery manurial trials were badly checked by the drought but one has shown a visible response to dressings of fresh and composted sisal waste.

Manured and unmanured foodcrops were sown between the rows of young sisal planted both in single-rows and double-rows in the inter-planting trial. The cereals, maize and sorghum, reacted to the fertilizer treatment but afterwards failed owing to the drought. Further sowings could not be made later in the year; thus the young sisal has only been intercropped for a short period. Nevertheless sisal which had grown in competition with sorghum has a yellow and spindly appearance and has wilted severely.

Two of the external "spacing $\times$ cutting" trials on the Central Line are proceeding satisfactorily and the principal differences observable so far appear to be attributable to local soil and climatic conditions. A third trial of the same design situated in the coastal belt near Tanga has suffered from sisal weevil damage and losses of plants through wet bole-rot to such an extent that the experiment may have to be discontinued. A factorial manurial trial on an estate in the Tanga District, started in 1947 in connection with "banding disease," shows that the severity of the disease may be reduced considerably by applications of potash. The sisal was cut for the first time this year and plots receiving potash yielded nearly twice as much fibre as those which were not given a dressing of a potassic fertilizer.

Elimination of breeding sites, particularly the destruction of many thousands of unsuitable agave hybrids, coupled with the dry weather, has helped to reduce the sisal weevil population on the station. Results of an insecticides trial were inconclusive owing to a relative absence of weevil damage. The Entomologist, Lyamungu, carried out tests with certain systemic insecticides against the sisal weevil. An attempt to control the weevil by biological methods was made by introducing predators of the Banana weevil (*Cosmopolites sordidus*) from Trinidad. Three species, *Placius javanus*, *Leionota quadridentata* and *Dactylosterum subdepressum* were released on infested sisal plantations during the first part of the year, and latterly a number have been found at large in the field.

The propagation of agave hybrids was limited owing to a paucity of poling plants, although some cross-pollination work was carried out. Bulbils of selected hybrids were collected for raising in nurseries and a new comparative trial was planted.

A large and more comprehensive exhibit was prepared for Planters' Day which was well attended. Displays of sisal agronomic work and also of products manufactured from sisal (kindly supplied by Messrs. Irish Ropes, Ltd.), were shown in Dar es Salaam. A number of fibre samples submitted by estates were tested for fibre fineness.

The Plant Physiologist carried out nutritional studies of sisal by means of leaf extract analyses and pot culture work. These studies were mainly of a preliminary nature due to a lack of essential laboratory equipment. Attention was also devoted to the water-relationships of the sisal plant, transpiration rates and the effect of root promoting substances.

Over 8,200 budded citrus trees were dispatched to sisal estates and other purchasers. The station maintains a small herd of zebu cattle which are kept in fly-proofed byres.

A full Annual Report of the Sisal Experimental Station is published separately.

UKIRIGURU EXPERIMENTAL STATION AND LUBAGA SUB-STATION

The Chief Scientific Officer and the Senior Scientific Officer, Empire Cotton Growing Corporation, and the Botanist, Agricultural Department, are stationed at Ukiriguru. The Lubaga Farm, Shinyanga District, is used for sub-station work only.

The season has been the worst in the eighteen years for which records have been kept at Ukiriguru, but for experimental work it has been interesting and valuable.

The Chief Scientific Officer in summarizing the main experimental results in his progress report for the season 1948/49 reports as follows :—

“With bulrush millet as the crop, residual responses were measured at Ukiriguru in two resting crop trials in their fifth cropping year, but the responses in two other trials in their third cropping year were not significant.

Cotton, in the first cropping year, after a planted grass-legume fallow of three years' duration, showed a thirty-one per cent yield increase over the control, continuous unmanured cropping; but there was a yield decrease following a tumbledown fallow. In the same trial a dressing of three tons per acre compost gave an increase of sixty-four per cent; a dressing of 300 lb. single superphosphate gave a seventy-one per cent increase. These are striking responses.

Good fourth year residual manurial results were obtained with cotton, the highest an increase of thirty-six per cent over control from a seven tons per acre dressing of farm yard manure applied five seasons previously. There was a similar residual response from cotton seed ash, also applied five seasons previously.

The pointers are that phosphate is probably the nutrient mainly concerned in these residual manurial responses at Ukiriguru.

In a season when Jassid attack and Bacterial Blight were unimportant, UK. 48, the constituent strains, and sub-strains from them, showed on the whole satisfactory increase in yield over Mz. 561.

The selection and testing work continue—an important part of the cotton work of the station."

There is little change in the programme of work for 1949/50. The land resting trials and the manurial and fertilizer trials will continue to measure residual responses. The agronomic experiments continue as before with the addition of a weeding experiment on cotton. The cotton selection and strain testing work continues as in previous years and the grading work for resistance to Bacterial Blight is to continue.

The Botanist's Report on foodcrops for 1949 is included in Section V of this Report. The 1949/50 programme includes exploratory experiments on sorghum, rice, millet and selection work.

COTTON EXPERIMENTAL STATION, ILONGA

A Senior Scientific Officer, Empire Cotton Growing Corporation, is in charge of the station and an officer of the Corporation is stationed at Ilonga for entomological work. The Ilonga station development programme continued with the building of quarters for the staff and labour lines. The water supply scheme is completed. The main experimental programme consists of cotton variety and strain trials and selection and breeding of cotton strains for the Eastern Province as well as the routine study of entomological problems at the Ilonga Station and on District plots.

TUMBI AND MWANHALA AGRICULTURAL STATIONS, WESTERN PROVINCE

Tumbi.—The rainfall which was 22·24 inches was well below the average of 35·99 inches. There was a partial failure of crops and practically no surplus seed was available for sale. The arable area has been surveyed, laid out in six-acre blocks and a system of rotation arranged.

Mwanhala.—Fifty-three acres were under crop but yields were very low and the maize and paddy crops did not survive the bad season. Very little surplus seed was available for sale but a carry-over of seed from the previous season was eagerly taken up. Dams were enlarged and a demonstration peasant holding built. The development programme for the stock farm was improved by the Agricultural Assistant in charge of Mwanhala.

The very poor season has made the results of the experimental work at Tumbi and Mwanhala of very doubtful value.

MAHIWA EXPERIMENT STATION, SOUTHERN PROVINCE

Mahiwa has made some progress during the year: experiments with rice and other food crops continued, and an area was cleared for planting oil palms.

The nursery, orchard and vegetable trial plots were extended. The condition of the dairy herd was good and poultry consisting of fourteen Rhode Island pullets and two cocks were established at the station.

Several factors combined to make the 1949 rice harvest unsatisfactory. Selections were made from a number of rice varieties received for trial at Mahiwa.

MOROGORO FARM

The maintenance of varieties of crops including cassava, sweet potatoes, maize, sorghum and bananas, the preparation, sale and distribution of planting material and the supply of milk are the main activities of this station.

The nurseries were expanded and 11,468 fruit trees and 4,918 ornamentals were sold during the year, which was more than double the number distributed in 1948.

KINGOLWIRA PRISON DAIRY FARM

A scheme to supply Dar es Salaam eventually with 500 gallons of milk a day from the Kingolwira Prison Dairy farm was approved in September, 1949.

Work on the building programme, ordering equipment and materials and purchasing cattle began at once.

An Agricultural Assistant is in charge of the farming operations at Kingolwira. With a dairy scheme of this magnitude the operations are mechanized to the greatest extent and mechanical equipment was purchased to assist with the preparation for the cropping programme of 1950.

Dairy equipment and cattle will be purchased under the eye of the Senior Livestock Officer attached to the scheme. 64 Friesian/Boran heifers had been acquired by the end of November.

KUNGULI FARM, LUSHOTO

Further observations on potato varieties being tested for blight resistance were carried out at Kunguli Farm where this work has been in progress since 1946, with blight resistant types from the Scottish Society for Research in Plant Breeding, Corstorphine, Edinburgh.

In January another thirty types were received from Corstorphine. These were planted, together with a row of 914a(91) which had succumbed to late blight last year, to observe whether any of the new varieties are resistant to infection.

Complete records of planting, growth and yield of the new varieties and specimens are forwarded to the Director of the Scottish Society for Research in Plant Breeding for checking up on the resistance. The work at Lushoto continues.

SOIL AND WATER CONSERVATION

Various projects for soil conservation have been studied by the Senior Agricultural Officer, Soil Conservation.

The main activities of the Soil Conservation Service were concentrated on work to establish the Soil Conservation Centre at Tengeru near Arusha. Building work was in full swing during the year and quarters for two officers, main office, school building, garage, workshop and store were completed except for some minor finishing-off work, and the buildings were occupied at the end of the year.

Mechanical equipment ordered in 1948, consisting of tractors, terracers, scrapers, motor lorries and trailers, has been received and assembled. The three Agricultural Assistants attached to the Soil Conservation Centre are training drivers in handling machinery, surveyors in simple survey work and instructors in supervising soil conservation work preparatory to opening Tengeru as a training centre.

In Arusha District the broad-base terracing of several estates was carried out by machinery and staff from the Soil Conservation Service. Several demonstrations of bench terracing and narrow-base contour banking were also carried out by this service with financial assistance provided by the Native Authority.

In the Eastern Province funds were provided for the implementation of the Uluguru Land Usage Scheme. During the year a plan was drawn up based on the survey undertaken in 1948. Staff has been provided for three pilot schemes at separate bases selected on the eastern and northern slopes of the Uluguru mountains.

Much individual effort has been put into the construction of contour banks and other conservation work in the Central Province but a long term plan is under consideration for this Province, embracing comprehensive soil conservation measures. Dams were enlarged and a demonstration and water conservation measures, control of livestock and movement of population and livestock.

The outstanding achievement in the Lake and Western Provinces is the gratifying success with tie-ridging and manuring in many districts.

Tie-ridging is being adopted in the Southern Province and the increase in staff in the Province has made it possible to give more attention to soil erosion problems.

In the Southern Highlands Province most progress is recorded in the settled highlands of Tukuyu District, but erosion control in the Mporotos area of Mbeya District is less satisfactory.

In the scheme for the construction of small dams for the conservation of water and development of rice production being carried out in the Lake and Western Provinces, a total of twenty-nine dams in all have been built with capacities ranging from 200,000 to 12,000,000 gallons. During the year work was in progress on fifteen new dams. The average cost of these dams in the Western Province exclusive of contributions by Native Authorities is £130. Apart from the assistance given in dam-building for irrigation by funds provided from the Development Plan, a number of dams have been built by Native Authorities to provide domestic water supplies.

MECHANIZATION SCHEMES

Mechanization Schemes are in progress in the Eastern and Lake Provinces. Projects in the Eastern Province include Government mechanization trials to investigate the possibilities of mechanical production of rice and sorghum, and schemes operated by Native Authorities. In the Lake Province preliminary action has been taken to organize two pilot mechanization schemes. The following is an outline of the progress made during 1949.

Eastern Province.—A start was made in 1949 with mechanized rice growing to be carried out in 1950 with the complete mechanization of ploughing, sowing, cultivation and harvesting with a view to expanding mechanized rice cultivation in the Territory should the trials prove a success. Two areas were selected, one in the Rufiji and the other in the Kilombero valley, where considerable areas of unoccupied and sparsely-occupied land suitable for mechanical cultivation of rice are available.

The initial sorghum mechanization trial on the Wami plains is to secure advance information for the sorghum mission which was appointed to investigate the possibilities of large scale mechanical cultivation of sorghum in East Africa.

RICE MECHANIZATION TRIAL, RUFJI

Three hundred acres were cleared of light bush in July, ploughed in August with tractors and ploughs borrowed from the Rufiji Native Authority, and disc harrowed prior to sowing in December.

RICE MECHANIZATION TRIAL, KILOMBERO VALLEY

One hundred acres were cleared, stumped and ploughed. The area has been disc harrowed to await planting rains.

SORGHUM MECHANIZATION TRIAL, WAMI PLAINS

Two hundred acres were selected and will be prepared in time for planting. The site selected is acacia woodland on black cotton soil and considerable clearing is necessary. The machinery has arrived for the work.

NATIVE AUTHORITY SCHEMES

One thousand four hundred and sixty acres were ploughed in the Rufiji valley following the successful ploughing of 700 acres of land in that area in 1948. The Rufiji Native Authorities propose to purchase machinery with a capacity of 5,000 acres to be ploughed for Africans by tractors on payment.

One hundred and ninety acres were ploughed at Bagamoyo and 188 acres at Kilwa for Africans by the tractor units borrowed from Rufiji.

The areas ploughed have been divided up into plots of an acre each which have been taken up by cultivators. Some cultivators have aggregates of five acres and the enthusiasm shown for this method of cultivation indicates that there is likely to be a demand for organized mechanical cultivation services.

The Native Authority scheme which was organized by the District Commissioner was given assistance from the Agricultural Department in the ordering and supervision of the machinery.

Lake Province.—Four tractors have been purchased. The equipment includes one caterpillar tractor with scraper to break new lands and three heavy tractors with ancillary equipment suitable to plough the heavy lands in Sukuma. Although the tractors had arrived, only a few of the implements were delivered before the end of the year and consequently it was only possible to carry out demonstrations in 1949.

FISHERIES

The Fisheries Officer (Inland Fisheries) transferred his headquarters from Chunya, Lake Rukwa, to Kigoma, Lake Tanganyika, in March. Having completed his investigations on Lake Rukwa Fisheries, the Fisheries Officer is now engaged on an investigation of the Lake Tanganyika fisheries, and as opportunity offers, on the fisheries of swamps and rivers. The Lake Rukwa Fisheries remain under the supervision of the Fisheries Officer, but routine duties will be carried out by the Fish Guards of the Chunya District Native Authority.

Negotiations were completed towards the end of the year to purchase a motor fishing vessel for Lake Tanganyika, and pending the arrival of this vessel only preliminary work on the detailed survey of the Lake coastline has been possible.

The Fisheries Officer, Korogwe, who is engaged on the development of fish farming with a view to spreading the knowledge of this technique, has established an experimental station at Korogwe consisting of six fry ponds, six breeding ponds and one producing pond. Breeding ponds established elsewhere will be stocked with fish from the experimental pond at Korogwe with a view to breeding suitable species of fish for distribution to employers of labour who wish to establish fish ponds on their own estates.

Details of the work and progress made so far are given in the Annual Reports of the two Fisheries Officers quoted in Section V.

The establishment of a Marine Fisheries Organization in the Territory was fully considered at the East African Marine Fisheries Conference held at Tanga in July, as a preliminary to initiating this organization in 1950.

PUBLICATIONS

Articles sent to the Editor, *East African Agricultural Journal*, for publication during the year 1949, were as follows:—

January issue:—

“Some Problems of the Chagga on Kilimanjaro” by R. J. M. Swynnerton, M.C.

“Defoliation of Crops by Gemmiferous Fungus” by G. B. Wallace.

April issue:

“The Families of Freshwater Fishes of Tanganyika Territory, with a Key to their identification” by G. J. Lockley.

July issue:

“The Control of Antestia in Coffee” by F. B. Notley.

“The Control of White Stem-borer (*Anthores Leuconotus*) in Arabica Coffee” by J. K. Robertson.

October issue:

“The Maintenance of Soil Productivity in Sukumaland and adjacent areas, Tanganyika” by J. E. Peat and A. N. Prentice.

Pamphlet No. 1.—Fisheries Series “Preliminary Notes on Fish Farming.”

COUNCILS, BOARDS AND COMMITTEES

The Director of Agriculture is a member of the Legislative Council and is Chairman of the Cotton Board, the Tea Board, the Coffee Board, the Sisal Experimental Station Management Committee and the Coffee Research Station Board of Management. He is also a member of the Sisal Board, the Labour Board, the Seeds Board, and the Natural Resources Board. He attends all meetings of the Pyrethrum Board and is Executive Officer of the Natural Resources Board. The Deputy Director of Agriculture acted on a number of *ad hoc* committees during the year and the Senior Agricultural Officer (Headquarters) continued to represent the Department on the Tanganyika Industries Committee.

SECTION III.—FINANCE

The financial provision was £264,120 in the Territorial estimates and £147,232 in the estimates of the Development Plan for the year 1949, as compared with £214,030 and £141,246 respectively in 1948.

The Empire Cotton Growing Corporation continued to meet the Personal Emoluments of four Empire Cotton Growing Corporation Officers posted to the Territory for cotton investigations, and the salary of the Ginnery Inspector was again provided by the British Cotton Growing Association. This financial assistance is gratefully acknowledged.

In addition to the provision made under the Departmental Head of the Territorial Estimates and in the Development Plan the following provision for services connected with agriculture were made in the Territorial Estimates for 1949 :—

							Provision of funds 1949
Head and Sub-head							£
SUBSIDIZATION AND TEMPORARY BONUS :							
Guaranteed Minimum Returns	...	...	...	...	...	...	2,000
SUBVENTIONS :							
Commonwealth Agricultural Bureau	...	...	...	...	...	...	1,290
Imperial Institute	...	...	...	...	...	...	400
Imperial College of Tropical Agriculture	...	...	...	...	...	...	1,500
International Red Locust Control	...	...	...	...	...	...	10,570
Rothamsted Experiment Station	...	...	...	...	...	...	35
Migratory Locusts	...	...	...	...	...	...	2,320
Grant to Tea Board	...	...	...	...	...	...	800
Grant to Pyrethrum Board	...	...	...	...	...	...	1,050
Grant to Coffee Board	...	...	...	...	...	...	6,849
Total							26,814

SECTION IV.—LEGISLATION

The following legislation in connection with agriculture was enacted during the year.

Agricultural Products.—(Ordinance No. 57) African Agricultural Products (Control and Marketing) Ordinance, 1949. This Ordinance provides for the declaration of areas in which the production and purchase of specified produce may be controlled and regulated by Boards which may be given power with the consent of Legislative Council to make Orders for the compulsory marketing of produce through an agent appointed by the Board. Provision is also included for the imposition of a levy and the creation of a fund.

Cotton.—Cotton Tax (Amendment) Ordinance, No. 9 of 1949. This Ordinance amends Section 2 of Ordinance No. 12 of 1933 and authorizes the tax to be increased from one shilling to three shillings per hundred pounds or part thereof. The reason for the proposed increase is to provide funds for the benefit of the cotton industry.

Cotton Ordinance, No. 11 of 1949. This Ordinance consolidates and amends the provisions of the Cotton Ordinance, 1937. Provision is now made for the requisitioning of cotton seed for use outside the area of the ginnery from which

it comes for the purpose of facilitating the introduction of improved varieties into general cultivation. A system for the licensing of cotton weighers is established.

Government Notice No. 53. An Order made under the Cotton Ordinance, 1949 cited as the Cotton (Cotton Board) (Establishment) Order, 1949, states who shall be members of the Cotton Board.

Government Notice No. 145. Rules cited as the Cotton Rules, 1949, revoke the Cotton Rules, 1937, the Cotton (Amendment) Rules, 1946 and the Cotton (Amendment) Rules, 1947 and prescribes new rules.

Government Notice No. 195. An Order cited as the Cotton (Tax) Order, 1949 revokes the Cotton (Tax) Order, 1933 and imposes a tax at the rate of three shillings for every hundred pounds or part thereof net weight of cotton lint.

Tobacco.—Native Tobacco (Control and Marketing) (Amendment) Ordinance No. 4 of 1949. This Ordinance amends Section 4 of the Native Tobacco (Control and Marketing) Ordinance, 1940, and provides for the constitution of Native Tobacco Boards to consist of such members as the Governor may deem fit to appoint provided at least one-third of the members shall be native tobacco growers. Provision is also made for Boards to be bodies corporate.

Seed Production.—Government Notice No. 2. Rules were made under the Exports Seeds Ordinance, 1947 cited as the Export of Seeds Rules, 1949.

Sisal.—Government Notice No. 119 cited as the Sisal (Cess) Order, 1949 revokes the Sisal (Cess) Order, 1947 and provides for a cess at the rate of five shillings for every ton or twenty-five cents for every hundredweight of sisal produced in the Territory.

Government Notice No. 297. A rule cited as the Sisal (Cess) (Manner of Collection) Rules, 1949 that the cess shall be collected by the Tanganyika Sisal Growers' Association.

Coffee.—Coffee Industry (Registration and Improvement) (Amendment) Ordinance No. 29 of 1949. This Ordinance repeals the Coffee Industry (Registration and Improvement) (Amendment) Ordinance, 1948 and permits the appointment of a second official member of the Coffee Board.

Government Notice No. 76. An Order under the Defence Regulations, 1939 cited as the Defence (Sale of Mild Coffee) Order, 1949, appoints the Tanganyika Coffee Growers' Association Ltd. as sole purchasing agent for all mild coffee harvested in the Northern and Tanga Provinces and grown by non-natives in the Mbeya District.

Pyrethrum.—Pyrethrum Industry Ordinance, No. 18 of 1949. This Ordinance replaces the Pyrethrum Industry Ordinance, 1939, which is repealed as a result of the substantial amendments required by the pyrethrum industry.

The new provisions include Government representation on the Pyrethrum Board and the licensing of pyrethrum growers.

Government Notice No. 15. Regulations cited as the Pyrethrum Industry (Levy) Regulations, 1949 provide for the use of monies derived from the levies.

Government Notice No. 272. Rules cited as the Pyrethrum Industry (Collection of Levy) Rules, 1949 appoints the Pyrethrum Board as the agency for collecting the levy imposed by the Pyrethrum Industry (Collection of Levy) Rules, 1949.

Government Notice No. 279 cited as the Pyrethrum Industry (Levy) Order, 1949 imposes a schedule of levies upon all Pyrethrum sold in or exported from the Territory as follows :—

Amount of Levy			Area
1 cent per pound	...	...	Northern Province
3 cents per pound	...	...	Southern Highlands Province
1 cent per pound	...	...	Elsewhere in the Territory

Wheat.—Sale of Wheat (Amendment) Ordinance, No. 78 of 1948. As there is now no Wheat Growers' Association within the meaning of the Sale of Wheat Ordinance, 1940, this Ordinance broadens the definition of Wheat Growers' Association to include Associations approved by the Governor as adequately representing the interests of Wheat Growers, and whose by-laws have been approved by the Governor.

CONCLUSION

It is with much pleasure that I can acknowledge the enthusiastic work of members of the Department and in particular the devotion of the older men who have been called upon to take over not only greater responsibilities and larger areas but also the guidance of our many newcomers.

The thanks of the Department are also accorded to all members of the numerous Boards and Committees that assist in the work of the Department and progress of agricultural industry.

C. E. J. Biggs,
Director of Agriculture

SECTION V.—TECHNICAL AND SPECIALIST REPORTS

EASTERN AND CENTRAL PROVINCES

Introductory

With effect from the 31st May, 1949, the Central Province was placed under the agricultural charge of the Provincial Agricultural Officer, Morogoro, having an Agricultural Officer in Dodoma in charge of the Central Province to whom the agricultural staff in that Province was responsible. In the Eastern Province staff continued to communicate direct with the Provincial Agricultural Officer. While this arrangement has involved the Provincial Agricultural Officer in a heavy amount of touring and a substantial increase in office work (2,863 outward letters compared with 1,859 in 1948), it has worked well through the ready co-operation of the Provincial Administration and departmental staff of both provinces and the efforts of the two African clerks in the Provincial Agricultural Office.

The year will go down on record for the severity of its drought which, inevitable when so spread throughout the length and breadth of the Territory, brought to the Central Province one of its triennial famines and involved the

Eastern Province in heavy imports of food for rationed labour and urban dwellers, which are normally met to a considerable extent from local surplus production, and threatened localized famines in rural areas in the New Year.

The bright features of the year in the Eastern Province were the very high, in fact record, production of copra in the coastal districts with welcome increases in price to the producer, the good yields of cotton in the Ulanga, Kilosa and Morogoro districts to African and planter alike and the continued success of the sleeping sickness Settlements in Ulanga District where the 1,500 tons of paddy sold on markets was the only appreciable contribution to surplus food supplies made in the province. Castor seed in North Kilosa and sunflower in adjacent districts again proved a good standby in providing cash in a year of food shortage. The gradual expansion of Native Authority tractor ploughing schemes, particularly the one guided by the District Commissioner, Rufiji, and the initiation of departmental mechanization trials with rice and sorghum in the Rufiji and Kilombero valleys and on the Wami plains will, it is hoped, show the way to raising production both by the African cultivator and by larger schemes either of group farming and share cropping or by some local self-contained organization.

With one of the more severe famines in its history developing in the Central Province, it was necessary to divert attention to remedial measures. A grain collection to conserve seed supplies put 1,560 tons into the Native Authority silos. A strong and co-ordinated drive for the restoration of food production was initiated. The appreciation of the need for the co-ordination of policy in the control of tsetse fly, population and stock densities, water supplies and wood reserves on a sound land usage basis and the continued development of the Singida contour banking programme and its expansion to other districts, particularly Kondoa, gives promise of progress on soundly planned lines in the future.

It is apparent that a greater degree of mutual interdependence would benefit the two provinces under review. Some 290,000 acres of land, highly productive of food crops, await development in the Rufiji and Kilombero valleys. If preliminary trials of holding and fattening stock on the Mkata and Wami plains prove successful, large numbers of surplus stock might well be transferred out of the Central Province at the commencement of the dry season for holding and fattening prior to distribution to estates for rations or to the meat packers in Dar es Salaam.

CLIMATIC CONDITIONS

The season has been one of poor rains and widespread drought such as strikes the Central Province once in every three to five years, bringing about partial or complete failure of crops in the arid or semi-arid districts and food shortages even in those areas more favoured climatically.

In the Eastern Province it soon became evident that despite a good start, the 1948 short rains were developing a prolonged break about Christmas and this continued until the last week in March with disastrous effect to early planted maize and the rice crop throughout the Province, except in the Kilombero valley where the rice pulled through with a modest surplus. The sorghum crop once again demonstrated its ability to resist drought and made a recovery sufficient to avert famine in most areas for the time being. The main rains, beginning in the last week of March, were of short duration,

the last appreciable rain falling on the 21st May. Rain in the middle of July benefited the root and cotton crops, but by then the second maize planting had failed except in more favoured areas to the east of the mountain massifs of the Eastern Province. The period from the middle of July was one of the driest on record, the short rains not commencing until the 19th December, some six weeks late. As an example, the year's rainfall in Kilosa of 20·81 inches was the lowest for twenty-five years. As most districts in the Province are dependent for their early food supplies on maize planted in October or November, the year closes with famine threatening in the first six months of 1950 in several areas of the Eastern Province, particularly in the Rufiji.

In the Central Province rains were erratic and the lowest for many years, under eleven inches being recorded in Singida for the crop season. In Dodoma a break, following an early start to the rains in October, severely damaged the sorghum dry plantings while further breaks in January and March, followed by the early cessation of the rains in April, had so affected crops that famine became inevitable. Similar mal-distribution and curtailment of the rains in Singida, Kondoa and Mpwapwa Districts severely reduced the harvest except in small favoured areas. The dry season was prolonged to a full eight months and no appreciable rain fell until the end of the third week in December whereafter good rains and growing conditions for the 1949/50 season began. Delayed germination of crops will prolong the requirements of famine relief in 1950.

FOOD SUPPLIES

(a) *Eastern Province.*—In a normal year the Province produces a surplus of food crops of around 8,000 tons, including maize, sorghum, paddy, dried cassava and pulses which, added to the surplus estate production of some 4,000 tons, goes far to meet the requirements of rationed labour and urban dwellers. This year the only appreciable surplus has been the 1,500 tons of paddy produced in the Kilombero valley. While up to October the feeding of the rural population had not made heavy calls for the importation of food, in December food was being imported at the rate of 2,550 tons per month to supply rationed labour, rural and urban populations, including Dar es Salaam Municipality, and this was expected to increase to 2,850 tons in June, 1950, whereafter the new harvest should commence. At the end of the year food was being sold to local famine areas in North Ukaguru, the eastern Morogoro border, the Rufiji and villages in Bagamoyo and Kisarawe. When the difficult conditions became evident, the planting of cassava was pressed, especially in the Bagamoyo and Kisarawe Districts around Dar es Salaam, where reserves are always liable to rapid depletion, being absorbed by the population of the Municipality.

(b) *Central Province.*—The year started with 4,237 tons of grain in reserve in the 146 silos at Native Authority centres round the Province (three silos being built during the year, one each in Kondoa, Mpwapwa and Manyoni). This was but a tactical reserve and far from sufficient to stave off the coming food shortage. It was felt necessary to insist on the annual grain contribution to the silos at the rate of one sixth of a bag in the less favoured areas to the normal half bag contribution elsewhere in order to ensure that there should be adequate supplies of fresh seed should growers have failed to reserve an adequate quantity or should early plantings fail. Good

collections were made in Dodoma, Mpwapwa and Kongwa and 1,560 tons of grain were taken into the silos in the Province. A proportion of this reserve was issued for seed in Dodoma and the Manyoni Division before the end of the year.

In order to obtain an estimate of the quantity of food that it would be necessary to import and to confirm the preliminary district estimates, a ten per cent sample grain survey was undertaken in every Chiefdom of the Province by the staff of the Agricultural Department under the close guidance of the Agricultural Officer in charge of the Central Province. This was a more complete check than had been previously attempted. After making due allowance for the use of local surpluses by adjacent areas of shortage and, conversely providing that people should not have to walk too far to collect food, the import requirements of the districts for the months to April, 1950, were found to be :—

	No. of Silos	Grain in Silos at 1.7.49 tons	Total Food Deficit tons	Food Imports Required tons	1949 Grain Collection tons
Dodoma	33	685	6,000	5,315	718
Manyoni	8	144	1,500	1,356	23
Mpwapwa }	14	480	600	120	340
Kongwa }					240
Kondoa	30	728	3,500	2,772	126
Singida	61	2,200	5,000	2,800	114
	146	4,237	16,600	12,363	1,561

A Famine Officer was appointed to administer the grain supplies to food shortage areas. To obviate the need for famine camps and free issues of food and the considerable expenditure of money and time by Native Treasuries that had occurred in previous food shortages, all food brought into the Province has been sold to the trade through the Department of Grain Storage for retail to Africans at controlled prices. Up to the end of the year Singida was the only district in which it was necessary to start relief works and this took the form of contour banking in three Chiefdoms.

The Agricultural Officer, Central Province, reports that "in Dodoma district, Bahi and Kinyambwa, and five other Chiefdoms to a lesser extent, and in the Manyoni division Unyangwira (the largest and worst hit Chiefdom), Muhalala, Itigi, Nkondo and Isehe were the Chiefdoms most severely affected by famine. Considerable numbers of cattle died towards the end of the year, the only indication of their numbers being that the purchase of hides had to be stopped on account of excessive deliveries. In some areas cash for the purchase of food is running short and famine relief works may soon become necessary. In Kondoa the food position at the end of the year remained satisfactory with many people purchasing food. Usandawe Chiefdom suffered the most and a small tribe, the Waburungi, were also very short of food. In Singida all Chiefdoms with the exception of Iambi and one or two areas in Kisiriri and Isanzu have had to import food from outside, the Wilwana Chiefdom importing more food than all the remaining chiefdoms together".

Besides organizing a drive for cassava planting and multiplication, from September a vigorous campaign was initiated by the Provincial Administration, the Native Authorities and the Agricultural Department to stimulate early and increased cultivation, manuring and tie-ridging in suitable areas.

Additional staff was secured, including an Agricultural Assistant, two temporary Crop Supervisors and seventy-five temporary Instructors. From the Eastern Province were seconded another Crop Supervisor and sixteen experienced Instructors for the last three months of the year. Native Authority Tax and Grain Store Clerks, Hide Inspectors and Castrators were also seconded to the cultivation drive so that in the worst hit areas it was possible to have one supervisor to each village. The success of the campaign will, however, be governed by the outcome of the rains.

NATIVE FOOD CROPS IN DETAIL

(a) *Eastern Province*

PADDY	1945	1946	1947	1948	1949
Sales in tons	780	427	6,030	2,174	1,571
Hand-hulled rice	178	123	414	281	22

Rufiji was hard hit by the drought, particularly the western areas and any surplus production was retained locally by growers for sale to their neighbours. The main contribution to surplus production came from the Kilombero valley. In Kisarawe district the crop was an almost total failure and any small surpluses there may have been in Morogoro and Kilosa were not attracted to the open market.

MAIZE	1945	1946	1947	1948	1949
Production in tons ...	4,369	1,920	*12,347	*9,381	*2,188

(*Inclusive of total estate production and native sales on markets).

The long drought between Christmas, 1948, and the main rains killed the early maize crop except in certain favoured areas, while the late onset and early cessation of the long rains reduced yields to well below average. Small sales were made early in the year from the Rufiji short rains' crop and later in the Matombo and Turiani areas of Morogoro district and in Kilosa, native sales of maize on markets in the Province totalling 590 tons. A promising dry season swamp maize crop in Ulanga was spoiled by drought and maize stalk borer.

SORGHUM	1945	1946	1947	1948	1949
Sales in tons	512	103	1,333	1,095	343

Although the sorghum crop received a severe check from the early drought, it once again proved its value in areas of uncertain rainfall by getting away with the rains and yielding a fair crop, even where both the early and late maize crops were complete failures. Local surpluses were generally withheld from the open market for direct sale to people in search of food.

VEGETABLES	1945	1946	1947	1948	1949
Morogoro District	322	473	408	644	775
Kilosa District	402	300	292	200	190
Total	724	773	700	844	965

Despite the dry season production by Africans of vegetables in the Uluguru Mountains continued to expand, partly because a new market was opened in the heart of the vegetable-growing area at Mgeta, relieving the growers of a long walk to Morogoro, and partly due to the provision of a steady seed supply, 89 lb. of mixed vegetable seeds being bought from Kenya by Native

Treasury advances and sold direct to growers in the mountains in small packets by Instructors. While Kilosa production has not recovered to its former level, steps are being taken to step up production in the Kidete Station area to supply Kongwa.

DRIED CASSAVA			1945	1946	1947	1948	1949
Sales in tons	...	...	1,368	155	470	237	523

The area planted to cassava in all districts is considerable, particularly in Bagamoyo, Kisarawe, Morogoro and parts of Rufiji. Although the exports of foodstuffs were controlled to meet the exigencies of the food shortage, there was a considerable leakage of cassava, which does not appear in market returns, from northern Kilosa and Morogoro to Kongwa, from Bagamoyo and Kisarawe to Dar es Salaam, and from southern Kisarawe to the Rufiji. In Morogoro 509 tons of dried cassava and 60 tons of green cassava were sold on markets.

OTHER FOOD CROPS			Sales in Tons				
			1945	1946	1947	1948	1949
Mixed Beans	...	...	265	101	341	358	263
Cowpeas	...	...	81	80	298	156	147
Green Gram	...	...	169	16	120	70	47
Pigeon Peas	...	...	114	22	1,925	158	95
Onions	...	...	168	153	89	111	150
European Potatoes	...	...	17	222	82	73	120

Kilosa district was the main producer of beans and most of this found its way to estates. Morogoro and Kilosa were the main producers of cowpeas and onions, Morogoro of potatoes, Kisarawe of green gram and the Rufiji of pigeon peas.

(b) *Central Province.*—The Agricultural Officer, Central Province, reports on food crops as follows:—

“GRAIN CROPS.—The long periods of drought resulted in most areas reaping a poor harvest. In Dodoma two plantings were necessary and in Mpwapwa three to four. Except in the higher and more favoured areas of Kondoa and Singida, poor yields were also recorded in these districts. Maize again showed its unsuitability as a crop for areas of uncertain rainfall. Bulrush millet withstood the dry periods better than sorghum. In Singida, through a false estimation of the degree of shortage, sales of grain on markets were permitted until late in the year, the total of 231 tons including 131 tons of sorghum, 72 tons of maize, 24½ tons of bulrush millet and 3½ tons of finger millet.

RICE			1945	1946	1947	1948	1949
Sales in tons	...	...	29	½	69	24	¼

In Dodoma and Manyoni districts the March drought destroyed the crop in the main rice-growing areas of Bahi, Kinyambwa and Nondwa and, as happened in 1946, a negligible quantity was marketed. This resulted in an acute seed shortage for the 1949/50 season which was met by importing 240 bags of paddy from Ifakara, Tukuyu and Ukinguru. In the Lumuma and Ipera Chiefdoms of Mpwapwa only a small acreage was planted and only small yields were harvested due to bird depredation.”

“PULSES.—From a surplus production in Kondoa of 305 tons in 1947, there has been a total absence of surplus production in the district ever since.”

“SWEET POTATOES.—When the grain failure became apparent, a drive to stimulate sweet potato planting was initiated in Kondoa district but, as in 1948, the effort had been made too late and little crop resulted. The ex-Polish farm near Kondoa township was laid out in quarter-acre plots and sweet potatoes under irrigation yielded well. In Singida the crop only survived in very damp areas.”

“CASSAVA.—While cassava is an unpopular crop among the Wagogo, it has been proved at the Dodoma seed farm and by observation of scattered native cultivation that it is a crop which will survive the severe dry season and still yield a fair reserve of food. Cuttings for planting are difficult to secure while damage from pig and porcupine is always severe.”

“The Provincial Commissioner, shortly after his arrival in June, after consulting his District Commissioners and the Agricultural Department, laid down a three-year programme whereby a ten-acre cassava field, fenced, ditched and ridged, should be established at each Chief’s headquarters in the first season, at Sub-Chief’s headquarters in the second and in all villages in the third. The response in most districts has become encouraging. In Dodoma the fourteen chieftdom blocks were finished by Christmas and planting with cassava had commenced at the year-end. In Kondoa the response to this campaign was most gratifying, the third year of the programme being entered upon in each of the three Chieftdoms, while the field at Pahi is in fact forty acres in extent. Further, small groups of 6-10 people have put in their own communal plots. It has been necessary to secure cuttings from outside sources for Usandawe and Burungi. In Singida twenty-seven ten-acre fields were completed. In Manyoni a cassava-planting programme had been initiated in 1947 and this provided a valuable source of cuttings, 500 bundles being supplied to Mpwapwa and Kongwa districts where the response has not been so good. A similar quantity of cuttings was being sent to these districts from Morogoro. In Mpwapwa a total of forty acres was prepared in nine Chieftdoms. In Singida sales on markets amounting to 6½ tons of dry cassava took place.”

AFRICAN CASH CROPS

(a) *Eastern Province*

COTTON		1945		1946		1947		1948		1949	
400 lb. bales	...	...	4,780	...	6,224	...	6,631	...	6,079	...	9,620

Prices were maintained at the same level as in 1948, varying from 53 to 59½ cents per kilogram for first grade seed cotton and this stimulated the demand for seed. However, with the late onset of the rains many people were too busy planting their food crops to get their cotton planted early. Nevertheless good yields were secured in Ulanga, Kilosa and Morogoro to produce the best Provincial crop for some years, and the dry season kept pests well in check so that the cotton lint was exceptionally clean. Rufiji, where the rain-grown crop in the early stages promised to be better than for some years, was the exception to this as the crop was caught by a very severe attack of pink bollworm. Also the almost complete failure of the Rufiji to flood in its lower

reaches precluded the planting of any but a small area of floodland cotton. In the Uzigua area of Bagamoyo the rainfall was just insufficient to bring away the big crop that had been hoped for.

COPRA			1945	1946	1947	1948	1949
Sales in tons	...	...	5,443	4,637	2,193	4,764	9,388

Several factors contributed to the abnormally heavy crop which was unaffected by the dry season. The initial flower buds of coconut palms are laid down some two years before the nuts mature so that the good rains of 1947 may well have made their contribution. There were two substantial increases in the price of copra during the year, which rose from Shs. 8/75 to Shs. 12/75 per frasila, providing a great stimulus to the manufacture of copra. Finally improved plantation sanitation, which has been pressed over the last few years, probably exerted a beneficial effect. However, the preparation of copra of good quality remains one of the biggest problems in getting the industry on to a sound footing. In the middle of the season the glut was such that the stores of millers and their agents were full to overflowing, mills were working to capacity and they were short of bags for copra and drums for oil. In September the Economic Control Board agreed to permit the export of copra and coconut oil in reasonable quantities, but at the same time a tax was placed on exports of Shs. 190/- per ton of copra, Shs. 120/- per ton of coconut oil and Shs. 60/- per ton of coconut cake. The congestion was gradually relieved. These good conditions were reflected in the revenue from the Government coconut plantations at Bagamoyo which, although reduced in number, yielded £1,224 in 1949 for an expenditure of £507. The Department of Economic Control permitted the export from the Eastern Province of 4,787 tons of copra, 1,816 tons of coconut oil and 3,193 tons of coconut cake.

TOBACCO.—At Mahenge the trials with fire-cured tobacco continued, 564 kilos being sold for Shs. 1,260/50 from the Government experimental plot. Fire-curing was also undertaken for 60 Africans, who had been supplied with seed, the yield being 1,151 kilos of tobacco worth Shs. 2,100/-, of which Shs. 500/- was placed to reserve with the Native Treasury. The prospects for the new season promise well, 650 potential growers having taken seed under the supervision of four Instructors. A tobacco press was constructed during the year to bale the crop.

In Morogoro, native tobacco sales increased from 13 to 26 tons. In Kilosa District the production of roll tobacco at 16 tons was normal. The Agricultural Officer, Kilosa, reports that, while the type of tobacco grown is very mixed, some very good plants are to be found and he is undertaking seed selection on a small scale at Kidodi. A few plants suffering from mosaic disease were seen at Kidodi and burnt while a limited incidence of Nematode was found on the Ulanga border.

The Tobacco Officer, Iringa, reported generally adversely on the prospects of developing a flue-curing tobacco industry in Morogoro and Kilosa Districts but small trials are to be laid down. These, however, are districts which suffer neither shortage of cash crops nor opportunity for profitable employment.

OTHER CASH CROPS

Sales in tons	1945	1946	1947	1948	1949
1. Arrowroot (Tacca Starch)	153	3	121	82	24
2. Beeswax	4½	10	6	7	5
3. Cashew Nuts	347	218	348	661	444 (a)
4. Castor Seed	268	342	698	850	690 (b)
5. Charcoal	1,269	1,107	1,925	2,806	3,270 (c)
6. Gum Copal	22	57	59	26	36
7. Raffia Fibre	67	75	84	21	7½
8. Sesame	523	224	201	355	238 (d)
9. Sunflower	—	—	—	117	405 (e)

Notes—

- Cashew nuts are mainly produced on Mafia Island and in Kisarawe District.
- Castor seed again proved a good source of income for the people of northern Kilosa where drought affected food crops.
- The production of charcoal is included to indicate the increasing rate of denudation of the protective forest cover in the Pugu Hills of the Kisarawe District to supply the needs of the Dar es Salaam Municipality.
- The sesame surplus came mainly from the Rufiji and Kisarawe Districts.
- This was the second year in which sunflowers have been grown by Africans. It proved its ability to withstand drought and produced a fair crop. Prices were slightly reduced to discourage excessive production in competition with grain crops. Strong complaints were received from United Kingdom importers of adulteration with castor seed.

(b) Central Province

The Agricultural Officer, Central Province, gives the following record of cash crop production :—

GROUNDNUTS	1945	1946	1947	1948	1949
Sales in tons	1,260	721	1,677	994	43

The season was the worst for at least the past ten years, the crop being largely a failure and Singida being the only district to sell any groundnuts on the markets, part being retained for re-sale as seed. Seed supplies in Manyoni for the 1949/50 season were so short that they had to be sought from outside the Province.

ONIONS	1945	1946	1947	1948	1949
Sales in tons	256	174	415	296	156

The onion crop was the smallest for the past five years, less even than the last drought year, 1946. In Singida, the main producing district, the yield was but half of the previous season's crop. In Mpwapwa onions are popular in the south-eastern part of the district but they are sold over the border in Kilosa. The demand for imported Indian seed continues, 1,200 lb. being sold during the year, although the onions produced therefrom were not nearly so true to type as formerly.

POTATOES.—Small quantities are grown in Kondoa and Singida Districts and 16 tons came on to markets compared with 20 tons in 1948.

CASTOR SEED	1945	1946	1947	1948	1949
Sales in tons	160	94	306	473	333

Castor seed is a useful cash crop in the Kongwa District adjacent to the Kilosa producing areas. The decrease in tonnage marketed was not as severe as might have been expected from the season.

GUM	1945	1946	1947	1948	1949
Sales in tons	171	182	106	76	131

In a dry year it is customary for the people to resort to the gum areas to a greater degree to supplement cash reserves and this season's crop was in excess of the past two crops.

BEESWAX AND HONEY	1945	1946	1947	1948	1949
Wax	34	30	40	92	9½
Honey	91	57	185	175	10½

There was a marked decrease in the amount of beeswax and honey due to unfavourable weather conditions, particularly in Kondoa.

SUNFLOWERS.—This was the second season in which sunflowers had been grown and the crop was slightly greater than 1948, 192 tons being marketed as against 182 tons. Increased yields in Dodoma and Mpwapwa were offset by a decrease in Singida. This crop is not so popular as castor seed in some areas but is reasonably drought-resistant. The black type is more popular and produces fewer empty seeds or lights.

Other Cash Crops

(a) *Physic Nut.*—This crop grows wild or is planted as a hedge around homesteads. It was sold for the first time in Singida this year, 17½ tons being marketed.

(b) *Vegetables.*—In Singida thirty tons of European-grown vegetables were marketed, while an estate in Mpwapwa supplied the Overseas Food Corporation at Kongwa with two tons of vegetables per day.

NON-NATIVE AGRICULTURE

(a) *Eastern Province*

With the appreciation that private enterprise can make a substantial contribution to agricultural production on lands not required for African settlement in the foreseeable future, Government has allocated twenty 500-acre farms in the Dakawa area of the Morogoro District for food production (eight of them to sisal estates), has under survey a further forty such farms within and without the area of the Magole short term leases in the Kilosa District and has allocated 5,000 acres for rice or sugar production on the Ruvu River in the Bagamoyo District. Good farming clauses are attached to these leases which are for thirty-three years in the first instance but which may now be extended to ninety-nine years. Substantial development in these areas, which it is hoped will be mechanized to avoid competition for the small labour force available, should help to raise food production besides assisting to reduce the incidence of tsetse fly.

Sisal.—The major plantation industry of the Province was badly hit by the drought, which is expected to affect yields and quality in 1950.

The labour recruiting organization worked satisfactorily. Production amounted to 37,678 tons compared with the previous record of 36,375 tons in 1948. Helped by devaluation, the c.i.f. price of first grade sisal rose to around £110 at the end of the year.

While estates in Morogoro and particularly Kilosa Districts made a determined effort to raise a considerable proportion of their food requirements themselves or through contractors, they were only successful to a limited extent on account of the bad season. As other producers were equally badly hit, the bulk of their food requirements had to be imported to feed the labour force of 40,000 at prices which rose from Shs. 22/80 per bag of 100 kilograms of meal at the beginning of the year to Shs. 49/50 per bag at the end.

Sugarcane.—It is estimated that the year's output of "jaggery" was 1,289 tons, mainly from Kilosa District, and about half that of the previous year. Yields per acre from sugarcane are low, due as much to poor cultivation as to climatic conditions, the Agricultural Officer, Kilosa, reporting that "the cane is cut when over-mature, the plant is ratooned for too long a period and planting distances are too great. The price of jaggery has risen during the year and some planters are increasing their acreages".

Maize.—The season was disastrous on account of the late onset of the rains and their early cessation. Maize is, in fact, a precarious crop in any but the best of seasons in many areas of the Morogoro and Kilosa Districts, where sorghum is a safer crop. So long as they had the option, the respective Production Committees felt obliged to opt for the maize acreage planting grants of Shs. 40/- per acre as against the delivery bonus in order to secure the best return they could for farmers, sisal estates being ineligible for this grant. It is remarkable that only one application was made for the guaranteed minimum return of Shs. 60/- per acre in the Eastern Province and two in the Central. This was due to the fact that most maize on estates is interplanted with either cotton, sunflower or castor seed, all drought-resistant crops which yielded reasonably well. A joint Executive Officer was engaged for the Kilosa and Morogoro Production Committees to assess acreages and labour forces, the acreage required to feed the latter (based on the yields of an average season as assessed area by area by the Committees) also being ineligible for acreage grant. In the following summary of maize acreages and grants, with the Central Province included for ease of tabulation, the remarkable effort of sisal estates in the Kilosa District to produce their own food should be noted.

Acreage Planted to Maize

District		Sisal Estates		For Farmers' Labour		Eligible for Grants		Total
Kilosa	... ..	7,335	...	1,308	...	3,671½	...	12,314½
Morogoro	... ..	1,380	...	1,125	...	1,924½	...	4,429½
Central Province	...	—	...	90	...	308	...	398
Total	...	8,715	...	2,523	...	5,904	...	17,142

Pulses.—In Morogoro District estates produced 73 tons of pulses and in Kilosa 162 tons, including 75 tons of cowpeas, 65 tons of mixed beans and 22 tons of green gram.

Cotton.—Non-African production of seed cotton in the Kilosa and Morogoro Districts in the past four seasons has been as follows :—

	1946	1947	1948	1949
Seed cotton in tons	597	294	638	1,744

With the good price obtained for "crop", planters put in the biggest acreage in recent years, much of the maize crop being interplanted with cotton which withstood the drought well and produced a crop clean in the first two months of picking but badly stained later.

Rubber.—Production on Sanje Estate totalled 35 tons compared with 50 tons in 1948 and 45 tons in 1947. The dry weather and shortage of labour restricted production.

(b) *Central Province*

The three estates in the Province growing maize had a poor season and on two the guaranteed minimum return had to be claimed. For details of production refer back to paragraph on Maize in Eastern Province—(a) above. Two estates in Mpwapwa District produced vegetables and fruit to supply to the Overseas Food Corporation at Kongwa. Mseta estate is also going in for maize in the new season. A planter in Singida grows a small tonnage of vegetables for export to Dar es Salaam.

AGRICULTURAL INSTRUCTION AND EDUCATION

In preparation for the assembly of staff to implement the Uluguru Land Usage Scheme, arrangements were made to send Instructors from the Morogoro District to the Instructors' course run every six weeks on the Mlalo Rehabilitation Scheme near Lushoto. There they learn physically the construction of terraces and Hehe ridges, the survey of catchment areas and slopes and the allocation of land to its uses according to slope and drainage and the planting of trees, bananas and grass on appropriate lands. The first eight Instructors returned from their course in November and further contingents will attend in the New Year.

It was only possible to fill three out of a possible fifteen vacancies allocated to the Eastern and Central Provinces at the Instructors' Training Centre, Ukiriguru, for the new course beginning in September. An attempt is being made to remedy this by increasing the number of posts for suitable probationers and by giving talks in district primary and secondary schools.

Grade II Instructor, Thomas Kayombo was maintained at Bigwa Teacher Training Centre to teach the agricultural section of the syllabus and to supervise the work of the pupils on the school garden. At the request of the Principal, he transferred with the school when it moved to its new accommodation at Kidugala, Njombe.

In August the Provincial Commissioner organized a "summer school" for forty-three Eastern Province Chiefs at Utete and, besides discussion on Local Government, Native Treasuries and Native Courts, the Chiefs spent a day on the Rufiji tractor ploughing scheme and the Provincial Agricultural Officer was allocated a day on which the agricultural problems and development plans of the Province were debated.

Ploughing School, Mpwapwa.—The Agricultural Officer, Central Province, reports that "although the scheme was started in 1948, it was not until this year that any progress was made. During the year forty-five oxen were trained to the plough. Owners were taught how to handle both the oxen and the plough and were also shown how to make yokes and prepare hides for making harness. There was a fair demand for the Victory-type plough.

At Ikungi in Singida three Native Authority temporary Instructors were engaged in training the cattle of those who had purchased ploughs. When not employed on this work, they undertook ploughing on Africans' fields at a charge of Shs. 8/- per acre".

AFRICAN AGRICULTURAL DEVELOPMENT

(i) *Irrigation and Water Supplies*

(a) *Eastern Province*

In Kilosa the Agricultural Officer continued the good work begun in the previous year by the Senior Agricultural Assistant on the Kilangali irrigation scheme, increasing it to 1,000 acres, of which about 800 acres have been taken up by growers. The irrigation schemes at Mwassa and Lumuma ran satisfactorily, a new furrow was dug at Msowero (Kidodi) but awaits head-works, while the Kigobere furrow awaits a survey by the Water Development Department.

(b) *Central Province*

It is in such a year as the one under review that humans and livestock suffer most from the scarcity of water supplies in the Central Province which in turn aggravates the grazing and erosion problems. Attempts to establish people in tsetse clearings and settlement areas are particularly affected. The Agricultural Officer, Central Province, reports on the individual districts as follows :—

- (a) *Dodoma*.—The Water Development Department put in five boreholes at Hombolo, Itiso, Solou, Zagilwa and Makutapora and three dams at Sasajila, Loge and Chibole were constructed by hand labour. The district team prepared plans for the annual construction of one dam in each Chiefdom, twin hafir dams in selected areas and selective culling of surplus stock to protect water supplies. Before the onset of the rains, stock using the Makutapora water hole were reduced from 5,000 to 2,000 daily.
- (b) *Manyoni*.—No new dams were built during the year and those at Itigi, Isseke, Sasajila, Kinagali, Manyoni, Makasuku and Kintinku dried up well before the end of the dry season. At Majiri funds for the construction of rice dams were used for laying out long contour banks for impounding surplus water for the growing of rice.
- (c) *Singida*.—The people constructed one new dam at Msughaa.
- (d) *Kondoa*.—The Kandaga pipe line was completed and in operation by February supplying ample water for cattle and settlement at Mkekena. While Irangi is well off for water, the people of Usandawe and Burungi suffered great hardship from water shortage.
- (e) *Mpwapwa*.—Although a very dry season, no serious water shortage arose. Three boreholes were installed by the Water Development Department at Chunyu, Ngalamiro and Msagali, one dam was constructed by hand at Kibakwe (subsequently breached) and one commenced at Lukole.
- (f) *Kongwa*.—Five compensatory boreholes were drilled by the Overseas Food Corporation in Kongwa Chiefdom, while engines for pumping were installed at Sagara and Kongwa minor settlement. Dams constructed at Pandambili and Zoissa by the Water Development Department with machinery hired from the Overseas Food Corporation were holding water at the end of the year.

(ii) *Tractor Ploughing for African Peasants in Eastern Province*

Rufiji District.—Following the successful ploughing of 700 acres of land for the people of Ndundu in the Rufiji in 1948, the Rufiji Native Treasury borrowed £16,000 from the Local Development Loan Fund wherewith to purchase machinery for a scheme having a target of 5,000 acres to be ploughed for Africans by tractors on payment of Shs. 16/- per acre. Four Fordson Major tractors with Perkins diesel engines were secured, three with half-tracks and one with rubber tyres for general purposes, such as pulling a trailer. The machinery secured included :—

Three Fordson Major tractors fitted with half-tracks and Perkins diesel engines,

One Fordson Major tractor fitted with rubber tyres and Perkins Diesel engine.

Four John Deere 605 series five-disc ploughs.

One Alley Trailer.

One Bedford five-ton lorry.

Towards the end of the season two International Harvester TD9 tractors, ordered to deal with the heaviest ploughing jobs, arrived, while two John Deere six-disc ploughs were awaited to make up the full complement of the ploughing unit. The tractor with rubber tyres was required for general purposes as well as ploughing with a four-disc plough, pulling the Alley trailer with fuel, water and drivers between camp and the ploughing block daily. The lorry was invaluable in reducing the cost of transporting fuel and machinery on the 100 to 150-mile haul from Dar es Salaam to the job and for moving machinery and camp from one ploughing area to the next.

While the Agricultural Department ordered and ran the machinery on behalf of the Rufiji Native Treasury, the more difficult and less spectacular side of the scheme, on which depended its success, including propaganda, administration of finance and the collection of ploughing fees, was organized by the District Commissioner. It was essential, if the cost of ploughing was to be kept within the Shs. 16/- per acre, for large blocks of a minimum of thirty acres to be ploughed. The allocation of land thereafter was in units of square acre plots. However, the people preferred to retain their irregular "fields" until the District Commissioner placed the onus of allocation of land and the collection of ploughing fees in the hands of the ploughing groups formed in each block, when they appreciated the difficulties and accepted the acre plots. It is interesting to note that the people have in the main required the tractors to do the heavy job of breaking new land, the people still cultivating their old rice fields by hand.

Resulting from the bad season, surplus cash in the hands of the people from the sale of the poor rice and cotton crops and the sale of produce to Dar es Salaam was so short that it became evident that the people would be unable to pay in full in advance for ploughing. The District Commissioner therefore arranged that the members of each ploughing group should become collectively responsible for the ploughing fees of their block whereon advance payment would be reduced to Shs. 8/- per acre, the balance being fixed at Shs. 8/- per acre if paid before planting in November, Shs. 10/- if paid from the early maize harvest in February or Shs. 12/- if payment was deferred until the rice harvest in July. In the meantime preliminary arrangements are being made for the formation of primary ploughing co-operative societies.

In the outcome it was only possible to secure bookings for the ploughing of 1,460 acres for Africans in the Rufiji valley. Ploughing began at the end of July and it was found that in those villages where ploughing was held up by slow booking, the movement of the machinery on to the next village was sufficient to banish hesitation. However in a year when the full capacity of 5,000 to 7,000 acres of ploughing has to be tackled, it will not be possible for machinery to retrace its tracks, and the full-time assistance of an executive officer to precede the tractors and organize the ploughing blocks will be necessary if ploughing costs are to be kept to the minimum.

Besides ploughing in the Rufiji, the tractor unit moved down from Mohoro to Kilwa District in the Southern Province and up to Bagamoyo District to undertake ploughing contracts and it ploughed and disc-harrowed blocks for mechanized rice production by Government and the Rufiji Native Authority. Final acreages ploughed were :—

	Acres
Rufiji Africans	1,460
Government and Native Authority	
Mechanization Schemes :	
(a) Ploughed	400
(b) Disc-harrowed	830
(c) Planted	400
Kilwa District	188
Bagamoyo District	190

The year's work provided a good test for the machinery ordered. Ploughing varied from sandy silt to tough baked clay. No conditions were met which the heavy disc ploughs were unable to tackle. Similarly heavy tractors gave very satisfactory service. Seldom were more than three, and often only two, of the light tractors in operation at any one time.

The cost of the ploughing worked out at approximately Shs. 19/50 per acre. Teething troubles, acreages smaller than anticipated and long moves between blocks contributed to the rise in the cost above the estimate.

Bagamoyo, Kilosa and Ulanga Districts.—Tractor ploughing demonstrations were extended to other districts of the Eastern Province during the year. One of the Rufiji tractors was hired for a fortnight to plough 190 acres in three areas of Bagamoyo District, the people being allocated acre plots on payment of Shs. 16/-. In the Kilombero valley of the Ulanga District seventy-five acres were ploughed at four centres at a fee of Shs. 17/50 per acre, using the Fordson Major tractor and harrow-plough which had done the initial demonstrations at Ndundu in the Rufiji in 1948. Arrangements are in train for these two districts and Morogoro District to purchase their own ploughing units in 1950. In Kilosa ploughing trials at Kilangali on the Mkata Plains were unsuccessful as the ground had dried out too rapidly. A Ferguson tractor unit was purchased by the Kilosa Native Treasury towards the end of the year.

(iii) Seed Distribution

(a) Eastern Province

During the year 1,120 lb. of onion seed were sold by the Department in Morogoro and Kilosa Districts but the quality of the seed, as in the Central Province, was worse than in previous years. The 89 lb. of vegetable seeds sold in the Morogoro District through funds advanced by the Uluguru Native Treasury was responsible in no small measure for maintaining vegetable production at a high level for both Dar es Salaam and Kongwa, while in Kilosa over 1,000 small packets were sold in a similar manner. With the difficult conditions developing in the Province at the end of the year, arrangements were made to place for sale about 80 tons of maize and sorghum seed in the Province, particularly in the Rufiji, while 50 tons of paddy were sold in the Rufiji and Kilombero valleys. Smaller quantities of cowpea seed were also distributed. To the Central Province were sent 11 tons of paddy seed from Ulanga, 11 tons of bean seed from Kilosa and 10 tons of maize seed from Morogoro, besides a large quantity of cassava cuttings.

(b) *Central Province*

It was early foreseen that seed supplies in this Province would be extremely difficult and it was arranged to make a limited grain collection in each district however hard pressed it might be for food, to allow of redistribution should early plantings fail through drought. As already recorded, successful collections were made totalling 1,560 tons. Besides this it was necessary to import seed from other areas, especially the Eastern Province, 10 tons maize, 3 bags sorghum, 11 tons beans, 18 tons paddy and 3 bags of awned bulrush millet. The surplus seed from the Dodoma, Muhalala (Manyoni), Iguguno (Singida) and Masange (Kondoa) Native Authority seed farms was also distributed locally. Manyoni supplied Mpwapwa and Kongwa with 25,000 cassava cuttings each for planting in chiefdom blocks. From the Morogoro farm were being sent supplies of disease-free cassava cuttings for multiplication on the seed farms and on Chiefdom cassava multiplication blocks. In Singida some 1,200 lb. of onion seed were sold at Shs. 6/- per lb.

PESTS AND DISEASES

(a) *Eastern Province.*

Maize Stalkborer (Busseola fusca). This caused severe damage to the dry season swamp plantings of maize in many areas of the Province, particularly in the Ulanga District, where it greatly reduced yields.

Maize Streak.—This virus disease is very prevalent in the Province and the present season appeared to encourage it, much maize being greatly stunted by its effects. A programme of selection of resistant types of maize would be most desirable.

Grain Smuts.—Some head smut in sorghum was observed while infections of smut also took place in heads of bulrush millet in Kilosa District.

Tobacco Mosaic and Nematode.—The Agricultural Officer, Kilosa, records mosaic in Kidodi Chiefdom and Nematode on the Ulanga border but no extensive damage.

Sweet Potato Grub (Cylas compressus).—In the North Ukaguru area of Kilosa roots of sweet potato were badly attacked by a grub, probably the Black Weevil.

Elegant Grasshopper (Zonocerus elegans).—This insect did very severe damage to cassava throughout the Province in the dry weather preceding the December rains, after which a good recovery was made. Vegetables in localized areas were also wiped out.

Army Worm (Laphygma exempta and exigua).—Attacks occurred in parts of the Eastern and Central Provinces in January and February but little damage resulted.

Coconut Beetle (Oryctes monoceros).—Further good progress was made in the clearing up of coconut plantations and bush during the year by the two officers posted to the Bagamoyo and Kisarawe Districts for this purpose.

Cotton Stainers (Dysdercus spp.).—Stainers did not appear in large numbers in the crop until late in the season, in fact too late to do serious damage.

American Bollworm (Heliothis armigera).—Damage by this pest was on a smaller scale than usual, a few estates in Morogoro and Kilosa suffering some damage in the early part of the season.

Pink Bollworm (*Pectinophera gossypiella*).—A very severe outbreak of Pink Bollworm in the Rufiji in both rain- and flood-grown cotton reduced the crop to less than half that originally expected. Only the late crop was affected in other areas.

Red Bollworm (*Diparopsis castanea*).—The Provincial Agricultural Officer accompanied the Senior Scientific Officer and the Entomologist, Empire Cotton Growing Corporation, Kilosa, on a tour of the Rufiji in search of this pest which it was feared was moving up from the Southern Province as it has been found in the wild cotton plant, *Gossypoides kirkii*. In a three-months' search three Entomological Instructors had only been able to locate a red caterpillar in wild cotton at Mbwaru and no trace of it whatever was found in cultivated cotton in the same area or elsewhere. Of pupæ collected for identification purposes, one has hatched out and has proved not to be true Red Bollworm.

Field Mice.—The year was notable for the almost complete absence of this rodent pest to crops.

Birds.—Birds do extensive damage to the sorghum and rice crops throughout the Province before harvest, tying up a large proportion of men in guarding against them.

Vermin.—While in the coastal districts the people are accustomed to protecting their cassava against pig, nevertheless there is always a strong apathy to taking positive measures to fence crops or destroy vermin. Baboons, monkeys, elephants and hippopotami all take a heavy toll, hippopotami particularly in the Rufiji and Ulanga Districts. In several districts vigorous campaigns of poisoning, netting and hunting are organized seasonally and results for 1949 to hand are :—

				Bagamoyo		Kisarawe		Morogoro
Pigs	...	...	...	211	...	1,248	...	386
Monkeys and Baboons	...	...	...	727	...	1,117	...	1,908
Hippopotami	...	...	...	—	...	5	...	3

(b) *Central Province.*

The Agricultural Officer, Central Province, reports that :—

Striga.—Little incidence of this parasitic weed was seen.

Grain Smut.—Heavy smut infestation occurred in all Chiefdoms in Dodoma District but the effect was completely overshadowed by drought.

Grain Weevil (*Calandra oryzae*).—Heavy infestation in the Native Authority grain silos causes great deterioration in tribal food reserves. Where brick silos do not exist at Chiefs' headquarters, the grain is stored in the native wicker-type baskets or "vilindo". Next season it is proposed to undertake a programme of treating grain with gammexane as a protection against weevil damage.

Army Worm.—Heavy infestation occurred in the Dodoma District in January and early February but after a short sharp attack little permanent damage resulted. Considerable areas of Irangi in Kondoa were affected, some replanting of grain crops being necessary on the Masange tribal farm.

Birds.—Considerable toll is taken of dry-planted seed by birds, which also do great damage to the sorghum and millet harvests.

Vermin.—Baboon, pig and porcupine were causes of damage to crops in all districts while eland and elephant did local damage.

SOIL CONSERVATION

(a) *Eastern Province.*

Uluguru Land Usage Scheme.—During the year a plan was drawn up, based on the survey undertaken in 1948, for the implementation of the Uluguru Land Usage Scheme for which Government had allocated £50,000 in the Development Plan. It was to be based on concentration of staff, three Agricultural Assistants as Field Officers and a further thirty-six Instructors added to the existing Instructors and Forest Guards. They are to work out from three bases at Matombo, Mzinga and Mgeta where pilot schemes are to be developed in the first year to embrace the eastern and northern faces of the mountains and the central massif. Propaganda and administration of the scheme is to be undertaken by a District Officer specially seconded and aided by the Assistant Conservator of Forests and the Agricultural Officer, Morogoro. At the end of the year the arrival of the Agricultural Assistants was awaited, their houses had been built and eight Instructors, to be followed by others, had been put through the six-weeks' course run on the Mlalo Rehabilitation Scheme at Lushoto.

Steps to improve the anti-erosion measures on the hill and mountain lands of the Kisarawe, Kilosa and Ulunga Districts were initiated during the year. In the mountain areas of the Morogoro and Kilosa Districts there was a severe setback to the control of grass fires, the dry season leaving the bush so tinder dry that fires raged over vast areas from which fire had been excluded in the past several years.

(b) *Central Province.*

The Province is notorious for its recurrent famines, erosion and over stocking and up to the present no remedy embracing comprehensive soil, water and wood conservation measures, movement of population and livestock and culling of the latter, has found entire favour with the people.

While Kondoa-Irangi is a byword for its spectacular "lunar landscapes", nevertheless, the other areas of Singida and Gogoland have suffered from such insidious over-grazing and erosion that even after plentiful rain, large areas are unable to re-establish a satisfactory grass cover. Similarly with the large number of tsetse clearings, inter-departmental planning has as yet failed to get them settled on a proper land use basis whereby adequate water and fuel supplies, population and livestock densities are provided or maintained. They either become over-populated and stocked, treeless and eroded, or else are rapidly abandoned to regeneration succeeded by costly re-slashing of bush or infestation with tsetse. Following a tour by the Provincial Commissioner, Agricultural, Veterinary and Tsetse Officers in October, three categories of land in the Province have been defined:—

- (a) Areas so badly eroded that they cannot be protected or rehabilitated at an economic cost and therefore the only hope of salvation for them is absolute and complete closure so that they can be left to regenerate naturally. This process may take twenty years or longer.
- (b) Heavily populated areas where erosion has not yet gone so far that it cannot be arrested.
- (c) Settlement areas which should never be allowed to degenerate into conditions (a) and (b) but which should be protected right from the start.

While much effort has been put into the small individual contour bank, of which 393 miles were laid out by Instructors in 1949, mostly in Kondoa District, the two outstanding achievements in the Central Province have been the widespread adoption of manuring in the Dodoma District and the constancy of the tribal contour banking programme pursued since 1938 in Singida, where were situated 100 of the 130 miles of large contour banks constructed in 1949 in the Province, fifteen miles being done in each of the Dodoma and Kondoa Districts. These two measures require much wider adoption and maintenance in the other districts of the Province, as the small individual banks soon become lost. Protection of soil conservation measures against trampling by cattle is a major consideration.

Ridging and tie-ridging has an important contribution to make on the undulating land of the Central Province and the Dodoma Chiefs have ordered that all cultivation on sloping land should be on the ridge, with millet and sorghum fields excluded for the time being, while each taxpayer was required to tie-ridge a quarter of an acre of suitable land. While the initial work has not been of a high standard, the results were quite encouraging for a first year's effort.

A storm drain 1,230 yards long was dug at the base of Lion Hill in Dodoma Township and 3,900 yards of large contour banks were constructed around its foot, with bush slashing between these protective works and the aerodrome.

REHABILITATION, RECLAMATION AND RESETTLEMENT

(a) *Eastern Province.*

Ulanga Sleeping Sickness Settlements.—Further concentrations of population against sleeping sickness were made during the year in Ulanga District. The earlier settlements continued to expand their productivity, securing the only good rice harvest in the Province this year and picking an excellent harvest of 1,838 tons of seed cotton. The erection of a third ginnery at Mwaya by the Ulanga Cotton and Rice Company was approved and building commenced. Such concentrations of scattered populations are of immense advantage in the development of the rural economy, not only for the purpose of agricultural supervision and demonstration, but giving the people access to medical and educational facilities not otherwise obtainable.

(b) *Central Province.*

The Agricultural Officer, Central Province, records :—

Manyoni Division.—In the Unyangwira Chiefdom twenty-five square miles of bush were cleared and ring-barked in 1949, mainly in the Makasuku area. Since clearing some forty families have moved in and cultivated land.

Singida District.—Large clearings totalling sixteen square miles were undertaken against tsetse fly in Sepuka, Kisiriri, Isanzu, Nkumanga, Ikungi and Unyanganyi Chiefdoms. No settlement plans or policy for cleared areas have been drawn up as yet but the Agricultural Assistant reports that a lot of cultivators are coming into the cleared areas of their own accord and this is being encouraged. North of Mkalama many such settlers are Wasukuma from over the Nzega border who have fore-stalled the people who prefer to remain in the over-crowded Isanzu highlands.

Kondoa District.—In Usandawe tsetse clearing was carried out linking the Banguma settlement to Kwa Mtoro to prevent fly crossing from the Songa-Simbo area while another small clearing was made at Ovada. Other clearing included nine square miles on Chambalo Hill and at Haneti to protect the Great North Road from fly, while trees were ring-barked on Mwinyigamba Hill at its southern end. A narrow strip of clearing was undertaken at Daramatai in the Babu area.

In the eastern settlement area one square mile of *Acacia spirocarpa* was cleared and two square miles of regeneration slashed and burned at Bissi. At Kinyasi half a square mile of "miombo" was cleared and in the Chungai-Kisese settlement area eight square miles of clearings and regeneration were slashed and burned. Accurate figures of present settlement in this area are not available yet, the figure at November, 1948, being about 1,000 families. In 1949 while thirty-nine families were moved down by lorry to houses at the end of the Kandaga pipeline, others came of their own volition, while still others moved back to the hills. The original settlement basis of sixty-four families to the square mile is turning out to be too dense even if the cattle are grazed in the "mbugas" to the east.

Chakwe.—The village of Chakwe, some seven miles north of Kondoa, was evacuated by all except two families at the end of October on account of its extreme erosion, the evacuees being moved by lorry to houses and kraals prepared for them at Mkenena. It is proposed that this area should be closed completely to cultivation and grazing in order to observe the effects of natural regeneration.

Kolo Pilot Scheme.—A survey of acreages under crops and population and stock statistics was undertaken and an aerial mosaic photograph on rather too small a scale was taken by the Civil Aviation Department, which will be repeated in 1950 to a larger scale. Otherwise, on account of preoccupation with famine and changes of staff, little has been done in the Kolo area except for some good contour banking and gully stopping. The Field Officer for the scheme arrived in June.

Chemical Insecticide Unit.—The chemical insecticide experiment at Kikore which involves spraying blocks of tsetse infested bush from the air shows promise of being successful. The ground application of gammexane smoke against *Glossina swynnertoni* has greatly reduced densities without as yet effecting complete extermination.

Kinyasungwi Settlement, Mpwapwa.—A survey of this area to determine whether the people who had been moved from the Overseas Food Corporation land at Hogoro had sufficient land outside the Kongwa right of occupancy, found that many of the people had moved to other areas within the Kongwa Chiefdom and that those remaining had adequate alternative arable land. For these people the Mpwapwa Native Treasury purchased a plough and eight oxen to help them with their cultivations.

PROTECTION OF STORED GRAIN

No large scale treatment of grain with gammexane was undertaken in the Eastern Province comparable to that of 1948 as it was not necessary to store the small quantities of grain coming into the hands of the Grain Storage Department. A small trial with gammexane treatments of sixty tons of maize

had to be abandoned as it was required for native planting purposes. However, during the eighty-two days of the trial, the following losses in weight took place from the original bags of the treatments which had been made up to a standard weight of 100 kilos net :—

Treatment	Mean Weight Kg.
1. 0.025 per cent gammexane mixed internally with maize	98.25
2. 0.5 per cent gammexane applied externally to bags	97.20
3. Maize and bags untreated	95.56

In the Central Province considerable damage is done to grain in storage in Native Authority silos and arrangements are being made for gammexane protection in 1950.

MECHANIZATION TRIALS

Rice.—It has been recognized for some time that, if the sowing and harvesting of rice could be successfully mechanized, there is great scope for expansion in its production in the Rufiji and Kilombero valleys and elsewhere either by expanding the productivity of the indigenous African population under a system of group farming, or share cropping by some local farming body set up by Government or private enterprise. Trials were initiated during the year with funds voted by Government on the basis of 300 acres of rice at Utete in the Rufiji and 100 acres at Lupiro in the Kilombero valley. Native Authority tractors were hired for ploughing and disc-harrowing, Massey-Harris seed drills and combine harvesters were borrowed from the Overseas Food Corporation, while it was necessary to purchase disc-harrows, Ferguson tractors, ploughs and trailers, and hand winnowers. By the end of the year the land had been prepared ready for planting and seed had been assembled. While the main areas are to be planted with the popular local variety of Afaa (Faya), small areas of all the local varieties, as well as some secured from Zanzibar and Ukiriguru experimental station, are to be sown for observation. The main gap in our knowledge at present is the suitability of each variety for mechanical harvesting and in particular their degree of even ripening, non-shattering and lodging. Also a variety is required having a life length enabling machinery to get on to the land for planting before it becomes too wet and which ripens after the land dries out and can carry the combine harvesters. There can be no control of water as in those countries where mechanization is based on controlled irrigation.

Sorghum.—With the appointment by the Colonial Office of a Sorghum Mission to investigate the possibilities of large-scale mechanical production of sorghums in Tanganyika, among other territories, it was decided to initiate a small mechanization trial on the Mkata or Wami Plains of the Kilosa and Morogoro Districts to secure advance information. As for the rice projects, machinery was bought (including a Massey-Harris tractor and disc plough) or borrowed from the Overseas Food Corporation (land was selected in the Dakawa-Kwadihombo area), and bush clearing commenced prior to planting dwarf short-term sorghums in February or March, 1950. A feature of experimental work at Morogoro over the past twenty-two years has been the consistent failure of dwarf sorghums to mature a reasonable crop either because the bunch heads of the varieties undergoing trial have moulded in the damp climate or the heads have become heavily infested with weevils before harvest on account of the soft unprotected grain, whereas the giant native long-term varieties of sorghum have on the average far outyielded maize on

account of their resistance to drought. The breeding of open-headed dwarf sorghums having a hard or protected grain and possibly a long maturity period may well be necessary to justify complete mechanization. On account of competition for labour with neighbouring estates, it is unlikely that the full 200 acres will be cultivated for the coming season.

CENTRAL AND LOCAL GOVERNMENT FARMS

(a) *Eastern Province.*

Morogoro Farm.—Milk production averaged 2,328 pints per month with the usual seasonal shortage. The compost yard was kept in full production. With the increasing demand for planting material, the nurseries were expanded and 11,468 fruit trees and 4,918 ornamentals were sold during the year, more than double the number distributed in 1948. Stocks available for sale in 1950 are reduced as the budding of citrus during the prolonged drought was less successful than usual. A limited programme of experimentation indicated that planting distances of 3'×1' gave higher yields of sunflowers than wider spacings. Work was commenced on a fish breeding station to comprise six breeding ponds, six fry ponds and two production ponds for *Tilapia spp.* The policy of alternate husbandry, with three years under crops and three years under *Panicum maximum* grass for cattle fodder was maintained successfully.

Kingolwira Prison Dairy Farm.—The Agricultural Assistant was in charge of farming operations throughout the year, undertaking the field developments necessary to establish the projected dairy scheme to supply Dar es Salaam with, eventually, 500 gallons of milk a day. While some 4,000 acres had been previously cleared against tsetse fly, little or no stumping had been done so that most of the land was in no fit state to use tractor equipment. The policy has been adopted of stumping and clearing the land in ever increasing circles from the centre of the farm, of planting the land with crops for three years to kill off root regeneration of bush and then of putting the land under grass, again expanding from the centre, for the herd. In cropping, the aim is to plant an acreage sufficient to feed the 1,300 prisoners and prison staff and to provide hay, silage, fodder, grain and oil seeds for the cows. In all 1,088 acres of land were stumped during the year and the cropping programme for 1950 compares with that of 1949 as follows:—

Areas in acres

Crop	Prison	1949 Dairy	Total	Prison	1950 Dairy	Tot ^a
Maize	320	—	320	310	180	490
Sorghum	100	—	100	360	—	360
Cassava	17	—	17	40	20	60
Sesame	1½	—	1½	60	—	60
Sunflower	60	—	60	60	—	60
Cowpea	20	—	20	70	60	130
Silage (maize)	—	20	20	—	120	120
Hay (grass and cowpea)	—	20	20	—	70	70
Permanent Leys (to be planted)	—	—	—	—	360	360
Total Farm Crops	518½	40	558½	900	810	1,710
Rough grazings	—	200	200	—	200	200
Vegetables and Fruits	3½	—	3½	53	—	53
Experimental Crops	—	—	—	13	—	13
Total acreage	522	240	762	966	1,010	1,976

Kingolwira is an area prone to droughts and, except in limited valley bottoms, comprises infertile red soils. Only in a good year can reasonable yields be expected except of drought-resistant crops. For this reason a large acreage of sorghum is grown. The land carries good rough grazing while fodder crops which do not have to be grown to maturity, such as maize silage or cowpea hay, will provide a useful standby for the dairy herd. With the severe drought in 1949 yields of crops were low and 120 acres of early-planted maize had to be ploughed in. While much sorghum was lost through excessive handling, acreage yields were 1.7 bags for maize, 1.8 bags sorghum, 3.75 bags sesame and 2.2 bags sunflower. The vegetable garden was greatly expanded and 21,728 lb. of vegetables excluding cassava leaves were supplied for prison rations, nearly half being egg plant. With the construction of a large dam by the Water Development Department, the site of the garden is to be moved and greatly expanded.

With a dairy scheme of large proportions it is essential to mechanize operations to the greatest extent. While the project is based on prison labour, it is desirable for the prisoners to undertake the jobs which are most costly to mechanize and in the next few years that will be bush clearing, which it is hoped to carry out at the rate of 1,000 acres a year. There have been heavy calls on labour in 1949 for brick making, building of quarters for Prison Officers and the Senior Livestock Officer, the cattle yard and dairy and for routine prison duties. Nevertheless, there has been an average daily allocation of prisoners for farm work of 362 males and 48 females. The mechanical equipment at present includes three Fordson Major tractors, three Ransome's Dagon disc ploughs and three Baronet disc harrows, one Cockshutt disc plough, one Davis six-disc heavy plough, a Wood's light disc harrow and a five-ton Bedford lorry. On order are power lift, row crop and planting equipment for the tractors, two trailers, a grass cutter, an International TD18 heavy tractor and a three-ton Bedford lorry. If a final cropping rotation with 2,000 acres in cultivation is to be maintained an improvement and expansion in equipment will soon be required.

While a heavy tractor and plough were on order for the farm, the excellent progress made in breaking fresh land could not have been made had it not been possible to borrow the D7 Caterpillar tractor from the Agricultural Station at Kilosa or a Davis plough from Pangawe Sisal Estate, the former for two months, the latter for one. With these and the other ploughs 625 acres were cultivated in two months.

Progress has been slow in establishing adequate soil conservation measures but 1,000 acres have been protected with small contour banks pending a survey by the Senior Agricultural Officer (Soil Conservation). Other work has included the replanning of the farm into sixty acre blocks and fifty of these have been marked out with roads, giving now over seventy miles of cut roads on the farm.

While the Senior Livestock Officer, besides ordering the bulk of the dairy and milk cooling equipment, has purchased the first batches of cows in Kenya and some are being held at the Government dairy in Dar es Salaam, the small original herd at Kingolwira produced 20,189 pints during the year. A promising trial was undertaken with thermo dairy cans for the transport of cooled milk over long distances, a successful stall-feeding trial with steers was carried out and the manufacture of manure from the dairy and beef herd has been stepped up.

The progress recorded could not have been achieved without the ready support and assistance of the Commissioner of Prisons and the Superintendent of Prisons, Kingolwira.

Mahenge Tobacco Farm.—In trials at Mahenge a quality of tobacco much better than that of 1948 was produced, with a total yield of 564 kilos from one and a half acres. Seed was also grown and distributed to 650 potential planters. To establish a rotation and to find an alternative cash crop for the Mahenge massif, a preliminary trial with soya beans gave a moderate yield although planted in the height of the drought, while chick peas are being given a trial.

(b) *Central Province.*

Tribal seed farms to which the Agricultural Department makes a substantial contribution are established at Dodoma, Muhalala in Manyoni, Iguguno and Msingi in Singida and at Masange in Kondoa Irangi. These have served a useful function in crop trials, in producing seed and proving that reasonable yields may be secured in a bad year by sound cultural methods, and in providing centres of instruction.

MISCELLANEOUS MATTERS

The Colonial Office Sorghum Mission was met at Kongwa and taken to Morogoro and the Wami Plains to examine the site of the sorghum mechanization trial. Useful information and advice was secured from them and their report is awaited with interest. The American E.C.A. Mission was met in Dar es Salaam.

A Central Province Liaison Committee with the Overseas Food Corporation was established during the year to meet quarterly to exchange information on all matters of local interest to Government and the Corporation at Provincial and Regional level and the first meeting was attended in October by the Provincial Agricultural Officer and the Agricultural Officer, Central Province. Two other visits were paid to Kongwa in connection with mechanical cultivation and, as recorded elsewhere, very great assistance has been received from the Overseas Food Corporation in the loan of machinery for the Eastern Province mechanization trials and the provision of seed.

During the year two meetings of the Eastern Province Provincial Advisory Committee and the meeting of the Central Province District Commissioners' Conference in June were attended.

The Provincial Agricultural Officer spent the month of November at Jos in Nigeria as one of the Tanganyika delegates to two conferences, one of British African Colonies on "Land Utilization", the other of International African Colonies on "Indigenous Rural Economy" and the opportunity was taken to do a quick tour of parts of Northern Nigeria.

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WESTERN PROVINCE

GENERAL REVIEW OF THE YEAR

Weather

			Rainfall Season Sept. 1948 to May 1949		Year 1949		Average of Previous years
			Inches		Inches		Inches
Tabora	...	...	20.3	...	19.7	...	34.7
Tumbi	...	...	25.4	...	22.2	...	38.0
Mwanhala	...	...	26.1	...	25.4	...	32.5
Kahama	...	...	40.7	...	39.6	...	37.2
Kibondo	...	...	39.7	...	35.6	...	45.7
Kigoma	...	...	41.9	...	38.1	...	36.9
Sumbawanga	...	...	23.2	...	28.1	...	34.0
Mpanda	...	...	30.4	...	32.3	...	38.3

In the east and south, both the seasonal and annual rains were very unsatisfactory, both in the total precipitation and in distribution. In the west and north-west the rains were sufficient in amount though sometimes badly distributed. In Kahama the rain was sufficient and reasonably well distributed in most areas though rains were poor from January to May. In Kibondo, the rains, though below average, were well distributed, but some damage was done to crops by hail. In Kasulu and Kigoma the rains were good apart from a drought period in December, 1948, and January, 1949. In Ufipa, the rains were below average and there were long dry periods. In central Mpanda the rains were fairly good but in the Rukwa Valley and in Ilunde, they were inadequate. In Tabora and Nzega the rain was very poor and badly distributed. At Mwanhala, the rainfall was the lowest since 1943. Only 13.8 inches of rain fell in Tabora up till the end of November, and it is the lowest annual rainfall since 1909.

The 1949/50 season has started badly in the east and in Ufipa. In October the Kasulu rains were adequate, there were heavy showers in Kigoma, but the early rains in Kibondo after starting well, failed later. In November, the rains had started in Kahama and Mpanda but in Tabora, Nzega and Ufipa were still inadequate. In December, good rains had fallen in all districts but there were still dry areas including Tumbi.

General Crop Situation

The overall crop production was very poor in Nzega, eastern Tabora, and the Rukwa Valley, fair in western Tabora, Mpanda apart from the Rukwa Valley, and Ufipa, fairly good in Kahama and Kibondo and good in Kigoma and Kasulu. In general, the crops which survived the drought best were bulrush millet, sunflower and cassava. Maize, paddy and some of the legumes were very badly hit.

There have in consequence been no outstanding increases in crop production in 1949 as compared with 1948 except tobacco in Kibondo, but sunflower, palm oil, onions, beans and sesame showed an increase in the amount sold.

The most noteworthy advances in agriculture during the year have been the successful start of the tie-ridging campaign especially in Nzega, the rehabilitation work in the Luiche Valley, the satisfactory development of the Sumbawanga and Kahama sub-stations, and the great increase of tobacco growing in Kibondo.

Food Supplies

As a result of the poor crops, it was soon realized that several parts of the Province would be short of food. Fortunately, some areas in the west and north-west had good crops and there were good reserves of cassava in most districts, so that the Province was self-supporting apart from fed labour. The main shortage areas were Nzega District and the Rukwa Valley. The Agricultural Department Officers assisted the Administration whenever possible in famine relief work, by doing food surveys in Nzega and Tabora, by food distribution in Mpanda, produce buying in Kibondo and encouraging harvesting of surplus crops in Kigoma. There have been very considerable movements of food within the province mainly from Kigoma to Nzega and Mpanda, from Buha and Kahama to Nzega, and from west to east in Tabora District.

This food shortage has shown very clearly the great value of cassava and of the drives for cassava planting during 1947 and 1948. Where there was food shortage, it was largely where people would not or could not plant cassava.

Agricultural Implements and Tools

The demand for implements and tools from the Agricultural Department slackened off in 1949 for various reasons, mainly lack of ready cash due to food buying. Unfortunately, the scheme for popularizing wheelbarrows has been set back by the poor quality of barrow produced by the makers and the high price of barrow wheels bigger than standard size. The following tools have been sold to Africans; Native Treasury suspense accounts were used for buying in bulk.

		Ploughs		Barrows		Picks		Shovels
Nzega	...	20	...	4	...	2	...	4
Kahama	...	19	...	—	...	—	...	—
Tabora	...	5	...	8	...	—	...	—

DISTRICT AGRICULTURAL SITUATION

Tabora.—Crops were fair in the west and north-west grading to poor in the south and east. It is generally agreed that the extensive planting of cassava in 1947 and 1948 saved the district from famine and raised it to one of "local food shortages". Praiseworthy efforts have been the very extensive use of manure in the fields, the start in the tie-ridging campaign, and isolated examples of good progressive farming.

Nzega.—This district has suffered from food shortage, largely due to lack of rain, but partly to insufficient cassava planting. About 1,250 tons of food were imported mainly from Kigoma, Kibondo and Kahama. The people, however, tried very hard by repeated planting to overcome the results of the bad season. The district also suffered severely from water-shortage, rinderpest and wind erosion. The outstanding agricultural event of the year has been the great success of the tie-ridging campaign.

Kahama.—The crops in Kahama were adequate for local use, and there was some surplus for Nzega. The only area suffering food shortage was the new Sleeping Sickness settlement of Mpunzie. Manuring is now accepted practice, and the tie-ridging campaign has met with considerable success after some setbacks.

Kibondo.—There were local food shortages but these were easily met within the sub-district and 153 tons of mtama and maize were sent to Nzega. This area is backward agriculturally. Most of the able-bodied men are occupied in paid labour outside the district or in hunting and honey collecting, and most of the agriculture is done by the women who are as a rule even more conservative than the men. The fire-cured tobacco industry continues to develop in a most satisfactory way, and reflects great credit on the work of the Agricultural Assistant. A great deal of work must be done to raise the standard of agriculture and living of the Kibondo people, especially in the sleeping sickness settlement areas.

Kasulu.—It has been decided to start in 1950 a joint Veterinary and Agricultural station, using Native Treasury funds, in the Kasulu highlands primarily to try to solve the many agricultural problems of this interesting area. Crops have been good and some surplus was exported.

Kigoma.—This district has been the scene of great agricultural activity this year, and the Agricultural Assistant and Administrative Officers are to be congratulated on the success of their work. It is outstandingly the biggest exporter of produce in 1949, very good progress has been made in the Luiche Swamp reclamation work, and work has continued on the improvement of the palm oil industry.

Ufipa.—The rainfall was inadequate but crops on the plateau were sufficient to support the food shortage areas in the Rukwa Valley and to allow export of some produce, mainly to Northern Rhodesia. This district is very primitive agriculturally, but with the provision of markets nearby, the posting of a permanent Agricultural Assistant, and the opening of an Agricultural Development Centre, there should be considerable progress in the near future.

Mpanda.—The Agricultural role of this district is simple, mainly the provision of food for the mines and railway. This year there was severe food shortage in the Rukwa Valley absorbing all the food surplus of the remainder of the district.

CROPS IN DETAIL

Cassava.—This crop is invaluable in the Province as a famine reserve and as a general food of the people. It is also of considerable value as a cash crop. Kigoma District exported 1,555 tons of root and 480 tons of flour, together valued at Shs. 222,794 and care is being taken to replace the sales by new plantings. The main enemies of the crop are vermin and mosaic. Vermin are countered by the bulking of bitter-rooted "Liongo" cassava, and mosaic by the use of clean planting material.

Sweet Potatoes.—In the eastern parts of the Province, the severe dry season has killed out much of the planting material. There is little trade in sweet potatoes but it is a valuable food crop in the Province, and the staple diet of Nyaruunga in Kibondo.

Potatoes.—Only in Ufipa are any European potatoes grown; the crop was an almost complete failure this year.

Sunflower.—This crop withstood the drought fairly well but the marketed crop was lower than had been expected. 211.2 tons were marketed of which 113.1 were from Kahama. Seed has been distributed in Kibondo and Ufipa.

Sesame.—The amount of sesame grown in the Province though small is a slight increase on 1948.

Maize.—As expected, this crop suffered badly in the poorly distributed rains and only 848 tons passed through the Native Authority markets. People still persist, despite repeated failures, in planting maize in poor, unmanured soil and often too late in the season. In the west, the crop was fairly good.

Sorghum and Bulrush Millet.—Despite propaganda these crops continue to be replaced by maize and cassava. The Kakonko white mtama crop was excellent but elsewhere in Kibondo it was severely attacked by armyworm and loose smut. Red Mtama is used in Kibondo for beer making; the crop was good. The long term "Wiru" sorghum suffered badly as the rainy season was so short.

Finger Millet (Eleusine).—The Ufipa crop was fair on the plateau but a complete failure in the Rukwa Valley. In Kibondo a fairly good crop was harvested; any surplus goes into Urundi.

Wheat.—This crop is of little importance. Some is grown in Ufipa but the crop was below average.

Paddy.—Almost everywhere this crop was a failure due to drought, or overflowing in Kigoma. Only a few favoured localities produced a fair crop. In Kibondo, the Agricultural Assistant is encouraging "Afaa" planting to replace the poor quality "Maji maji" and a trial of hill rices is being laid down.

Groundnuts.—The crop in the main producing areas was small, with many shrivelled seeds or empty pods.

Bambarra Nuts.—This crop was almost a complete failure, except in Kahama.

Beans.—A failure in the east, but fair to good crops in the west and north-west were obtained. This is the main crop of the Waha and 405.3 tons were exported from Kibondo.

Other Legumes

Pigeon Pea.—Kigoma and Buha are the main districts for pigeon pea. Twenty-two tons were exported from Kigoma and sixty-five tons from Kibondo.

Cowpea was a failure in Tabora and Nzega but yielded a fair crop in Kahama.

Chickpea.—This crop has done well in Ufipa and Kahama but was poor elsewhere.

Green Gram (Choroko).—Kahama is the main producer—but only three tons were exported.

Tobacco.—The Kibondo fire-cured tobacco crop continues to make good progress, as these figures show:—

	1947/48	1948/49	1949/50 (estimated)
Growers	277	1,105	3,000
Kilos of leaf sold ...	3,709	36,310	100,000
Money to growers	Shs. 3,501/-	Shs. 33,668/-	Shs. 90,000/-

The Agricultural Assistant, Kibondo, reports that the Waha need considerable assistance in growing this new crop but are delighted at the money it brings in. The quality compares well with the tobacco of Biharamulo and Ngara. So far there have been few pests and diseases; hail occasionally causes damage. 3.9 tons of coil tobacco were railed from Tabora stations. Interest is being taken in the possibilities of flue-cured tobacco in the Tabora area, and the Tobacco Adviser's report was on the whole favourable. The main drawback is the uncertainty of water. Trial plots were laid down at Mwanhala and Tumbi.

Palm Oil.—The Kigoma palm oil crop marketed was 26 tons, valued at Shs. 38,448/-. The increase is due to the attractive price of Shs. 1/50 per kilo.

Palm Kernels.—The export of palm kernels was 239.6 tons, valued at Shs. 63,950/-. The export figures are 1946—10 tons, 1947—192 tons, 1948—263.6 tons.

Sisal.—There are four producing estates in the Province. Owing to drought and some machinery breakdowns, the crop was lower than was expected, only 1,345 tons as compared with 1,478 tons in 1948.

Onions.—This crop is gaining in popularity and the demands for seed from the Agricultural Department are steadily increasing. Ndoni Chiefdom in Tabora is the chief producer—Mabama and Ussoke stations railed 20.7 tons, and 42.2 tons were railed from stations in the Province. The Agricultural Officer, Tabora, sold 268 lb. of onion seed for Shs. 1,608/-.

Vegetables.—The interest in vegetable growing is increasing but there has been a setback this year. The Agricultural Department sells vegetable seed to African growers and this service is much appreciated. There are several outstanding vegetable growers—including the spinach gardens at Polomelo, the Chinese garden at Malagarasi and the Kafumbatwa estate.

Gum.—It was expected that the export of gum would be good this year as when crops are poor, people do more searching for gum. However, the drought reduced exudation and possibly restricted the area searched so that only 273.6 tons were exported in contrast to 314 tons in 1948. It is estimated that 6,000 Wanyiramba came into Nzega to pick gum.

Beeswax and Honey.—1948 was an exceptionally good year and 1949 an exceptionally poor one. The quality of the beeswax is fairly good but much of the honey is spoiled for export by boiling, and little progress has been made in our efforts to stop this practice.

The Provincial railings in 1949 were 176.9 tons of beeswax valued at Shs. 884,500/- and 30.4 tons of honey valued at Shs. 19,566/-.

PESTS, DISEASES AND VERMIN

The Province has escaped any very serious losses from pests and diseases in 1949 though some have caused severe damage locally.

Red Locusts.—In September, the Locust Officer, Kaliuwa, reported large concentrations of adult solitary stage Red Locusts in the eastern borders of the Malagarassi Swamps. It was feared that migratory forms might be produced and spread from the swamps. Mr. Vesey Fitzgerald of the International Red Locust Control visited the area in November and gave the assurance that there was no immediate danger.

Grasshoppers.—Grasshoppers did some damage to late-planted maize in the Rukwa Valley. Elegant Grasshoppers did severe damage locally to cassava in the late dry season but were not so widespread as in previous years.

Stalkborer (Busseola fusca).—This is the worst pest of grain crops, especially maize, in the Province. In 1949 it was not as severe as usual except in Kibondo and Ufipa.

Calidea beetle was very prevalent on sunflower and ripening sorghums though the amount of damage done is not known.

Army Worm persisted into January in Kigoma, Kasulu and Ufipa and did some damage to young grain crops and grass.

A *Galerucid beetle* reduced the valley-bottom maize crop in Kibondo by eating the silks.

Coconut beetle.—The Agricultural Officer, Tabora, investigated instances of damage to coconut trees in Tabora.

Elworm was locally prevalent and did damage to tobacco and vegetables.

Birds.—Finches did great damage to ripening grain especially bulrush millet, and duck did local damage in the paddy fields.

Vermin.—By far the worst vermin in the fields are pig, baboon, porcupine and rats. Where the Native Authority has had the energy to organize drives, large numbers of pig and baboon have been killed. Reports are received of damage by elephant, hippo, buffalo and buck but such damage is very local. A scheme of rewards for vermin destruction in Kigoma was not a success.

Witch weed (Striga and Alectra).—The agricultural instructors have a hard task each year enforcing the up-rooting of these damaging parasites.

DISEASES

Mosaic of Cassava.—This disease is still very prevalent despite the department's teaching for many years to use only clean planting material. Resistant strains have been introduced from Amani and Bagamoyo but these have proved so popular with pigs as to be quite useless.

Rosette of Groundnuts.—The only control methods we use are to teach close spacing and the destruction of diseased plants. The problem of carry-over in diseased plants and in volunteers during the dry season is probably not of great importance as few can survive the drought of the dry season and the attention of grazing animals.

Loose Smut.—This disease caused considerable losses in the white mtama in Kibondo.

MARKETING

Native Authority Markets were closely controlled in Tabora, Nzega and Mpanda, being restricted to the more favoured areas or to produce other than food. Kahama markets functioned fairly normally. Buying points were organized by the Administration and Agricultural Department in Kibondo to supply mtama and maize to Nzega; 153 tons of grain were bought. In Kasulu the little produce exported was bought by selected traders. In

Kigoma District new markets were opened at Uvinza, Nguruka, Nkondwe and Luguru and a special drive for cassava buying was organized in Mwandiga to supply the Nzega and Mpanda famine areas. The only method of knowing the Ufipa surpluses sold is by means of the export licences.

Help was given by the Agricultural staff to the Administration in running the produce markets.

The produce market figures give an under-estimate of the amounts of surplus food crops and of cash crops sold by Africans, as much is sold outside the markets. The railage figures, on the other hand, sometimes give an over-estimate as they may include double railings, e.g. the same consignment of beeswax may be noted from Kaliuwa to Tabora and from Tabora to Dar es Salaam, as the railway returns do not show the destination of the consignments.

ESTATE AGRICULTURE

Help was given, whenever it was requested, to estates, missions, schools and prisons in their farm work. The Agricultural Assistant, Kigoma, supervises the prison farm and orchard there with noteworthy success. There are four producing sisal estates in the Province and two in preparation.

AGRICULTURAL STATIONS

Tumbi

This has been a difficult year at Tumbi. The bad rainfall, the continued absence of cattle and periodic labour shortages, have led to partial failure of the crops. The rainfall was 22.24 inches, well below the average of 35.99 inches. Cattle are still excluded from the farm because of the danger of trypanosomiasis, but it is hoped that the extensive bush clearing round the farm will allow their return in 1950. Meanwhile, 50 goats were imported from Nzega; 19 have died from trypanosomiasis and other causes but 24 kids have been born.

Development work.—Two labour lines each of three rooms have been completed, the foundations of a third laid, and a kitchen and latrine built for the labour. A new office with a small tool shed has been built and improvements made to the farm manager's house.

The arable area has been surveyed, laid out in six-acre blocks separated by roads and a system of rotation arranged. Eighteen acres of regenerating bush were cut back. Tie-ridging is standard practice and erosion is negligible.

The crops were almost complete failures, and there was no surplus seed for sale from this season's crops. There were few diseases of crops, but heavy damage was done by pig, baboon and rats. The nursery and orchard have been considerably enlarged.

A Pasture Research Officer is now stationed at Tumbi; he is living in the European quarter and is using the facilities of the farm until his own are prepared. About 3,000 acres of bushland west and north of Tumbi farm have been surveyed and are being cleared for the "miombo" pasture research station of the Veterinary Department.

Mwanhala

It has been a very busy year on Mwanhala farm. Not only had the Agricultural Assistant, Mr. Allen, to supervise the farm development building and other work, but he was put in charge of building the stock farm and the school for native authority personnel and selected farmers. Fifty-three acres of land were under crop, but the general standard of yield was very low, being only 163 kilos of clean grain per acre. The crops which survived the bad season best were bulrush millet, milo sorghum, cassava and sunflower; other sorghums, "Mgongo" groundnuts, cowpea, bambarra, and tepary beans were fair; but maize, paddy and the remaining legumes were failures. This of course provided very little seed for distribution, but fortunately there was a fairly big carryover from the previous season and this was eagerly bought.

Development work.—The two dams were doubled in size and 100 acres of regenerating bush cleared. A demonstration peasant holding, consisting of house, kitchen and latrine and cattleshed, was built, and a three-roomed labour line, using Agricultural Development Funds. Using Native Treasury funds, the agricultural school has been started and one double quarter was finished. The foundations of the nine other double quarters and of the central hall were laid and concreted. Using Nzega Creameries funds, the large stock farm block was nearly completed by the end of the year. This consists of a poultry house, four bull pens, cowshed, calfshed, six pig-styes, store and offices. A house for the African Veterinary Assistant and for a headman, each with out-buildings have been completed. A dam for the stock farm was finished. A piped water supply to the stock farm, labour lines and Agricultural Assistant's house has been installed by the Water Development Department.

The labour supply has been very variable, being over-plentiful in the dry season and almost unobtainable when most required at the beginning of the rains. The farm stock has withstood the bad conditions very well. There are 24 work oxen, 23 cows and calves, and 4 pigs. Fifteen piglets were sold to the Nzega Creameries for fattening.

Lugela (Kahama)

Good progress has been made in the development of the farm. The office, seedstore, tool and implement shed, four small houses for labour and a latrine have been completed. The farm has been laid out with roads, divided into blocks and surrounded by a fence. The dam has been enlarged and the rice fields below properly laid out for irrigation. Twenty acres of land were under crop but gave only fair yields; a fruit tree orchard was laid out and planted.

An ox cart and ploughs were bought. Labour was plentiful till December. The farm stock consists of 20 work oxen, 18 cows and 9 calves.

Sumbawanga

About 100 acres have been cleared of trees and bush and fifteen acres planted. Fair crops were reaped except of onions. Chick pea and sunflower did well and will be encouraged in the district. The following buildings have been completed, overseer's house and office, headman's house, labour line, each with kitchen and latrine, and a poultry house. There are fifteen cattle on the farm. The Agricultural Department is co-operating with the Forestry Department in establishing a tree plantation adjacent to the farm.

Simbo (Kigoma)

A ten-acre oil palm nursery and plantation growing good quality Belgian Congo palms for future seed supplies has been cleared and planted at Simbo in the Luiche Valley. Nearby, the Agricultural Assistant is starting a small rice shamba demonstrating approved cultivation practices.

SUMMARY OF EXPERIMENTAL AND DEMONSTRATION WORK

The poor season has made the results of the experiments of very doubtful value.

Tumbi

Experiment 36.—Various kinds of fallows. In the second year residual, the maize after pigeon pea fallow was still significantly better than all other treatments, and all fallow treatments were significantly better than control (continuous maize).

Experiment 40.—Manuring. One ton cattle manure per acre gave significantly greater yields than three tons second year residual. Over three years the total crop yields were practically the same.

Experiment 41.—To test sodaphosphate and other artificial manures and lime. The crop of groundnuts was very poor and no obvious differences were seen.

Experiment 43.—To test the value of removing small heads of sunflower—the plot yields were very variable and no significant results were obtained.

Hungarian Rices.—The five varieties of Hungarian Rices all gave very much smaller yields than the two local varieties “Moshi” and “Afaa”.

Mosaic-Resistant Cassavas.—These cassavas have again suffered so severely from depredations by pigs and rats as to be useless for bulking in the district. A cassava is required that is resistant both to mosaic and animals.

Mwanhala

M.3. Ridging.—No significant results were obtained testing various sizes of ridges against flat cultivation. This is possibly due to the adverse weather and the experiment will be repeated.

M.5. Sunflower.—No significant difference in yield was obtained by removal of the small sunflower heads.

M.1. Fallows.—The second year residual crop after elephant grass was just significantly better than after pigeon pea which was significantly superior to indigenous grasses and control.

M.6. Manurial.—Four tons of kraal manure per acre gave significantly better yields than two tons of either shed or kraal, four tons of shed manure was intermediate in effect.

M.4. Sodaphosphate.—The maize crop on this experiment was a failure.

Sorghum trial.—Fifteen American short-term sorghums were tested at Mwanhala. The very poor season did not give a fair test and the trial will be repeated in 1950. In the bad season the "Shallu" varieties gave the biggest yield, even beating local varieties, but the "Hegari" varieties were failures.

Onion Seed Trial.—An onion seed trial was carried out at Tumbi, Makere, Kasulu and Sumbawanga. As a result of the exceptionally bad season and a very severe thrips infestation in Makere and Kasulu the trial was a complete failure.

Two small but successful agricultural shows were held at Isagehe and Kahama, where the Agricultural Assistant held a demonstration of tie-ridging.

In Kigoma demonstrations of tie-ridging were made at each chief's and sub-chief's headquarters.

SEED DISTRIBUTION

The very irregular yield of crops in various parts of the Province has led to widespread seed distribution being necessary. Twenty-five tons of "Asiriya Mwitunde" groundnuts were collected in Ndonu and Usoke for seed for the Overseas Food Corporation, Urambo. Overseas Food Corporation, Urambo, supplied 11,507 lb. of short-term sorghum seed for Nzega, Tabora and Kigoma. Six bags of mango seed were distributed from Tabora to Kenya, Mpanda and Somaliland, and rice seed and mulberry cuttings were sent to Somaliland. Eighty-four kilos of oil palm seed were distributed from Kigoma to Muhesa and Kahama. Ten tons of paddy seed were bought from Kigoma to distribute in Tabora. In several districts the Native Authorities bought back seed from the traders.

Various fruit trees were obtained from Morogoro for distribution in the Province and some distribution was done from Mwanhala and Tumbi.

SOIL AND WATER CONSERVATION

The tie-ridging campaign has met with gratifying success after several years of apparently largely fruitless teaching. In Nzega, Kahama and Kigoma all new cultivation in upland fields must be tie-ridged. In Tabora the chiefs would not agree to compulsory tie-ridging except on the scheduled acre of cassava and even there only if the "acre" were reduced to sixty yards by sixty yards. However there has been some success even without legal backing. The best district is Nzega where it is expected that ninety per cent of the upland fields will be tie-ridged by the end of the season.

Some anti-erosion measures were done in Usagari Sleeping Sickness Settlement, but only when the Agricultural Officer could give personal attention to it. In Nzega, an area in Itiro was selected for a comprehensive scheme of soil and water conservation. Bush was cleared, 1,800 yards of contour bank, and two cattle dams made. In Kahama, the Agricultural Development Centre has been thoroughly protected by anti-erosion measures. Manuring is now accepted practice in Unyamwezi and very little propaganda is needed to persuade the lazier people to carry the manure to the fields. The next step, the storage of crop residues for feeding and bedding cattle in the kraals in the late dry season, is meeting with opposition. In Ufipa where

the practice of manuring is only now being pressed strongly the people oppose it on the grounds that they have always had enough crops to keep themselves alive without the use of manure. Grass and bush burning is still universal practice and teaching has had no effect yet.

Rice Dams.—Owing to the extreme hardness and dryness of the soil, it was not possible to build as many rice dams as we were prepared to do this year. The following were built :—

Tabora :

1. Msiliembe (Ibiri)	3,200,000 gallons (begun in 1948).
2. Ndono	7,000,000 gallons.
3. Ussungu	4,000,000 gallons.
4. Tumbi	2,000,000 gallons unfinished (using mechanical unit).
5. Uyumbu	Unfinished.
6. Mabama	50,000 gallons.

Nzega :

7. Mwakuru	40,000,000 gallons.
8. Itiro	250,000 gallons.

Kahama :

9. Mpunzie	750,000 gallons.
10. Isagehe	
11. "	Not yet measured.
12. "	
13. Mondu	

Kigoma :

14. Uvinza	200,000 gallons.
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Sumbawanga :

15. Sumbawanga	700,000 gallons.
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The average cost of these hand-made dams is about £130. Of these, 1 to 4, 7, 8, 14 and 15 were built from Development Funds only, 5 and 6 were built by a Chief with help from the Development Funds in piping and loan of tools; 9-13 were built by Native Authority funds with help from the Development Funds in piping, payment of headman and loan of tools. The people are still not making full use of the available irrigation water despite propaganda to do so. In 1947 they were suspicious and when that was overcome in 1948 there were insufficient rains to fill the dams.

AGRICULTURAL EDUCATION AND PROPAGANDA

There are seven students in course 9 and twelve in course 10 at Ukiriguru. Seven men returned in August from course 8 and were posted to their districts after leave.

The new stations at Kahama and Sumbawanga were visited several times by interested chiefs and people. The schoolboys of Mwanhala Middle School pay frequent visits to Mwanhala farm to be shown the work going on.

Several talks and lessons in agricultural matters were given by European and African members of the staff to schools in the Province.

The instructors continued their work as the liaison between the European Officers and the cultivators, putting across the lessons of good farming, obtaining prosecutions of persistent defaulters, reporting food shortage, assisting in food and crop surveys, marketing and so on. The Agricultural Officer, Tabora, held regular courses for instructors for two or three days each month at Tumbi.

Ploughing instruction was given at Mwanhala, Lugela and Sumbawanga.

BUILDING WORK

Apart from the buildings at the Agricultural Development Centres, the following building work has been done by Departmental Officers:—The temporary quarter for the Agricultural Assistant at Sumbawanga was completed and is occupied. A combined office store and garage for the Agricultural Assistant in Kibondo and four tobacco grading sheds were built. The instructor's house in Kigoma is complete.

LUICHE VALLEY RECLAMATION

Excellent progress has been made in the work of reclaiming the very fertile Luiche Valley near Kigoma from the disastrous overflowing of recent years. Money was voted by the local Native Treasury and the work has been supervised by the Agricultural Assistant, Kigoma. This year canoes and tools were bought, fish traps removed from the river beds, the main obstruction below the railway line was cleared and the old river bed dug out and straightened for a distance of 2,180 yards below the railway. At the Lake end, a channel 638 yards long and averaging six feet deep was cut from the river to the lake, shortening the course by about three quarters of a mile. Between these two cuttings (about three miles) the river bed was cleared of vegetation and debris except for a short distance near the lower end. The two breaks in the river below the railway were closed by barriers. A track was cut from the railway to the river mouth and a motorable road made round the south side of the swamp to the Lake. The main channel was officially opened by the Provincial Commissioner on 24th October. Recent heavy floods have broken the two barriers but a big percentage of the flood water follows the cleared channel and a big increase in cultivable land is confidently expected. This work has been done for Shs. 2,884/- for tools and equipment and Shs. 19,460/- for labour. The Agricultural Assistant makes special mention of the good work of headman Hassani Saidi, an ex-Instructor.

RESETTLEMENT

Assistance was given by members of the Agricultural Department to the Administration in the agricultural problems of sleeping sickness settlements, notably Kitunda in Tabora, Mpunzie and Diabohika in Kahama, and Kavumu in Kibondo.

MALAGARASSI SWAMP

Interest is being shown in these swamps as a potential development area for mechanized rice growing, sugar cane estates, fishing and cattle ranching. Data are being collected for the use of any of these schemes which may develop.

I wish to record the devoted work of both European and African members of the staff who have responded well to the heavy duties laid on them this year.

M. LUNAN,
*Provincial Agricultural Officer,
Western Province*

LAKE PROVINCE

GENERAL

In order to make the best use of the qualified technical staff available the Agricultural Officer, Mwanza, was relieved of his duties in that district, and under the title of Agricultural Officer, Lake Province (East), now assists the Provincial Agricultural Officer with technical matters in the area mentioned. A similar arrangement is proposed for the other side of the Lake. From the 1st January, 1950, there will be eleven districts in the Lake Province, the Mwanza District having been divided into three, i.e. Geita, Mwanza and Ukerewe. There is at present no agricultural officer resident and in charge of Geita. To the east of the Lake the absence of good rains was the most noticeable feature of the year, for, as always, the distribution of foodstuffs for large populations invariably upsets routine extension, and inhibits development. This year was no exception to the rule, for about 23,000 tons of imported food was estimated to be required to feed the population until the new crop comes in May. Some impetus was felt from the inauguration of the Cotton and Food Production Scheme by the addition of one hundred and thirty new African Instructors to the Department's Staff. The first impact of mechanization was felt during the dry season when tractors and some implements arrived. The Sukumaland Development Team got into their stride, but the absence of field staff precluded the carrying out of a full programme. In spite of the very bad season such large acreages of cotton had been planted that a large crop of cotton was harvested considering the appalling conditions under which it had to grow. Without the cash provided by cotton and stock, food would have had to have been issued on credit almost from the beginning, for no other saleable produce, except chickpea, survived in Sukumaland.

To the west of the Lake the reasonably even tenor of Bukoba weather was disturbed by periods of drought which limited food surpluses, but resulted in a heavy coffee crop.

Of great importance was the setting up in December of seven primary co-operative societies in north-east Bukoba with the prospects of a good many more in 1950.

The following statistics are indicative of the drop in production as compared with the previous two years :—

		Tonnage Marketed		Value to Producer £
1946	...	24,000	...	700,000
1947	...	50,000	...	1,000,000
1948	...	50,000	...	1,200,000
1949	...	36,000	...	1,200,000

WEATHER IN RELATION TO CROPS

In areas east of the Lake the planting rains were all too brief, and very intermittent. They were followed by a very long drought indeed in January, February and March. The precipitation in April was normal, but did not continue well on into May. The results were almost catastrophic. In some areas germinated seed never succeeded in growing more than a few inches in height. Planting was repeated three or four times. In these areas no grain whatsoever was harvested. It is probably the worst season experienced during

the British Administration of Sukumaland. Musoma fared a little better, together with the southern and lake shore areas of North Mara District. The Kuria area of North Mara was not badly served by rain.

In areas west of the Lake rain fell early in the year, but was disappointing. No serious food shortages, however, resulted. The 1949/50 season began with good planting rains in December.

LEGISLATION

The Cotton Ordinance was replaced by the Cotton Ordinance No. 11 of 1949, and the Cotton Rules were redrafted. Native Authority Plough Rules were promulgated in Sukumaland and a composite set of Soil Conservation Rules was also promulgated by the Sukumaland Chiefs. The latter consolidated different Rules in each of the four Sukuma Districts into one uniform set.

COTTON AND FOOD PRODUCTION SCHEME

A Cotton Committee was set up to advise the Director on the action to take in expending the £50,000 allocated for Capital and Recurrent Expenditure in the preliminary stages of the Scheme. This Scheme involves the appointment of fourteen Agricultural Assistants, and four hundred African Instructors, and the purchase of four tractors for two pilot mechanization schemes. This staff is to work in all areas where cotton is grown. The Department is in possession of sufficient knowledge as to how to improve yields per acre of both cotton and food crops, but in the past has lacked the staff to put it into practice. These Europeans are to work in much smaller areas and with far more African staff than has hitherto been possible. The machinery purchased so far is the following :—

1 D.7 Caterpillar Tractor (re-conditioned) and earth scraper.	To break new "mbuga" lands with the Ransomes 3-ton Sugadisc plough, and to dig water supplies.
1 W.D.9 with ancillary equipment	... To plough the heavier lands in central Sukuma.
1 W.D.9 with ancillary equipment, and with 54" ditchers for ridging.	To plough the lighter lands of north Sukuma.
1 W.D.9 as a spare machine.	

The Chief Scientific Officer, Ukiriguru Experimental Station, has ordered a Farmall Cane tractor, and disc-bedder and ridge-busting equipment for ridging the Experimental Station. This will enable the ditcher method to be compared with that of the bedder. All the four tractors have arrived for the Cotton Scheme, together with a few of the implements. Owing to the absence of staff it has not been possible to start these experiments during the year. The co-operation of the Sukumaland Development Team, however, has enabled us to demonstrate to the population around Malya what these tractors can do, so as to make easier the explanations and propaganda which will have to be undertaken in 1950. One tractor has been working in the light soil areas of the Bukumbi Development area with the same purpose in view. One hundred and thirty African Instructors have been recruited. They underwent a fortnight's Refresher Course at Ukiriguru Agricultural Training School after an arduous probationary period of two months on the Department's farms. It

is gratifying to report that very few indeed fell by the way side. This staff was allocated in groups to various districts with instructions that they should be used wherever possible in strength in limited areas.

Fourteen Agricultural Assistants will have to be housed; one building was completed. A store was erected at Mwanza.

PUBLICATIONS

The Instructors' Letter was published by this office quarterly. Papers in the vernacular are now published both in Bukoba and Ukerewe by the people themselves. Messrs. Longmans, Green and Company published "Agriculture of the Cultivation Steppe", and the Kiswahili version "Mambo ya Ukulima". This will be distributed early in 1950. Numerous manuscripts from the Director of the East African Literature Bureau were read over, of which a number are going to be very useful for our work.

ESTATE AGRICULTURE

Four hundred and sixty-five tons of sisal have been produced in Mwanza District. The increasing prices have enabled Raspadors to be set up here, and they are extracting fibre from the leaves of sisal hedges. In Bukoba a Company is interested in growing sugar, and the pilot scheme is confined to 300 acres of swampy land.

DETAILS FROM THE DISTRICTS

Food Crops

Famine conditions prevailed in Sukuma. 23,000 tons of food had to be imported. Musoma obtained its supplies of foodstuffs from North Mara, which normally exports its maize after the requirements of the Musoma mines have been satisfied. Parts of Bukoba suffered from food shortages of a temporary nature. Whilst cassava planting increased in the Kwimba and Musoma Districts there was a decrease in Mwanza owing to preoccupation with cotton. This has since been partly corrected in the 1949/1950 season.

Cash Crops

In Biharamulo a crop of 67 tons of fire-cured tobacco was produced. The actual production from the factory, which was derived from the Ngara and Kibondo Districts in addition, was 146 tons, an increase of eleven per cent on 1948. The price of 1st Grade tobacco to the grower was Shs. 2/20 per kilo. Improvement in the quality of tobacco is instanced by the fact that the average price per kilo to the grower rose from 92 cents to 96 cents.

About 40 tons of coil tobacco were produced.

Biharamulo is not entirely unproductive of other crops, for about 60 tons in all of pigeon pea, sunflower and coffee left the district. Ngara produced 77 tons of coffee. The effect of spraying which began mid-year has not yet been felt. Tobacco production increased to 33 tons, and it is now becoming more popular. Bukoba exported 7,470 tons of coffee, and there was estimated to be a big carry-over in the hands of dealers at the end of the year, amounting to probably 2,000 tons. The quality of the coffee sold by the Bahaya still leaves much to be desired. Nine coffee nurseries were established by the Agricultural Officer in various parts of the district on behalf of the Bukoba Native Coffee

Board. Half a million seedlings are now available for distribution, and the distribution has started. There will be little increase in acreage as a result, but blanks will be filled, and poor Arabica trees will be replaced. Owing to the high price being received for beans 2,000 tons were exported, and very nearly 1,000 tons of soya, twice the quantity in aggregate of these crops produced last year. There was a drop in the production of maize due to the improved prices for beans, and also to the drought. The Musoma cotton crop was very good, amounting to 3,025 bales actually produced within the district. All other cash crops were a failure. The maize production of North Mara was a little less than last year, amounting to 2,000 tons. Other crops were a failure. In Sukumaland, Mwanza produced the bulk of the cotton crop. The crop amounted to 37,080 bales, of which 3,000 were produced by Musoma, nearly 24,000 by Mwanza District, and 10,000 by the Maswa, Shinyanga and Kwimba Districts. Of the Mwanza total Ukerewe Island alone produced 8,000 bales. The total crop was worth £575,044 to the grower at the price of 24 cents per pound. The paddy crop amounted to 1,800 tons; the chickpea crop reached a record of 3,000 tons. The remaining cash crops were a complete failure. The chickpea crop is a steadily expanding crop, and so long as there is a demand for it by the Indian population it will continue to expand very quickly. The centre of production is the Isanga Basin at the southern end of Smith Sound, and the heavy soil valleys which drain into the southern end of that Sound. Preparation for the crop can be done at slack times, when the pickaxe and plough are used. It fits well into the planting programme, and thrives on the heavy soil, of which there are still hundreds of square miles vacant. Only 227 tons of sunflower were sold from the Province, partly due to the drought, partly to its unpopularity in certain districts, and partly because of damage by birds.

FOOD STORAGE

A plan for food storage in silos has been put up to the Provincial Commissioner. It is hoped that the onset of famine will persuade the Native Authorities that this is the only answer to obviating the inevitable preoccupation with food supplies which breaks into all routine extension and development plans every five years or so.

IMPROVEMENT OF SEED SUPPLIES

The Kahogo paddy issued in Mwanza and Kwimba produced practically nothing. As a result fourteen tons were again issued for sale to growers at the end of the year. The price of Kahogo again exceeds that of other paddy by one cent per pound, and it is hoped that we may succeed in 1950 in propagating Kahogo. The progress made with the multiplication and distribution of the two strains of cotton, U.K. 46 and U.K. 48, can best be described by a table :—

	U.K. 46	U.K. 48
1946 ...	1 ton of seed planted 103 acres.	—
1947 ...	14 tons of seed planted 1,000 acres.	—
1948 ...	188 tons of seed planted 10,000 acres.	1½ tons of seed planted 216 acres.
1949 ...	1,070 tons of seed planted five zones.	21 tons of seed planted in Bukumbikisu and Kome Island.

A normal year will ensure enough seed from U.K. 46 to distribute throughout the cotton areas at the end of 1950. Whether U.K. 48 will reach the whole Province in the same time depends on whether cultivators are willing to be economical with seed. A new technique in keeping seed pure is purposely to place cotton buying posts on the boundaries of the two strains in order to draw off that cotton which is sure to go into the wrong zone and cause admixture.

Progress with multiplying the mosaic-resistant cassavas has been slow owing to inadequate rainfall. Planting material is available again at Ukiriguru for distribution. Reports from districts indicate that these strains are not breaking down. Planting material of the pig-resistant cassava "Liongo" was introduced from the Western Province, and two varieties which grow in heavy soils were found in Kwimba District, and multiplied at Lubaga.

The Kudzu Vine has thrived in Bukoba District, and is to be used to keep down Couch in the banana fields on the Maruku Experimental station.

Three hundred and twenty pounds of Heavy Western Tobacco seed from selected plants were produced on the seed farm in Biharamulo. Seed of Robusta coffee was received from selected trees in Uganda for planting in the Bukoba Native Coffee Board coffee nurseries.

IMPROVEMENT OF FARMING SYSTEMS AND AGRICULTURAL PRACTICES

Attempts have been made to alter the system of burning off grass on fields in Biharamulo preparatory to cultivation, and to bury this grass under the ridge. There has been some improvement in the attention given to bananas in Biharamulo, and some cultivators have planted beans beneath them. In Ngara banana thinning continued, and is showing good results.

In Bukoba, whilst grass mulching is ubiquitous, nevertheless, in many instances it is only done under pressure.

It is difficult to judge how effective is the propaganda for the rotation of crops in Sukumaland. Really good results are unlikely to be obtained until the full strength of the enlarged Instructors Force, consequent upon the recruiting of the 400 Instructors of the projected Lake Province Cotton Board, is put into the field.

SOIL CONSERVATION AND SOIL FERTILITY

The staff in Biharamulo are attempting to persuade the people to demarcate the boundaries of their fields by planting hedges, as the usual method results in gullies running straight down the hill sides.

The Musoma staff have concentrated on improving the type of tie-ridging with considerable success. The flat cultivation of eleusine is having contour ridges placed across it measured by striding level. Grass strips are the rule wherever ploughing takes place, and fourteen Instructors were employed throughout the year in improving ploughing and insisting on these strips.

In North Mara grass strips are now the rule, but they are still too narrow. Manuring in this district has been the subject of much propaganda, and a few cultivators now practice it.

The population of Sukumaland must now realise that tie-ridging has come to stay and indeed the value of it in cassava is not denied. The Native Authorities have increased the acreage of tie-ridging every year, and in 1949/1950 one-third of the total acreage of each tax-payer should be under tie-ridge if it is on light land.

In Maswa district cultivators in one or two Chiefdoms carried out manuring extensively under supervision, including the making of manure by adding field residues. For the first time the collection and stacking of straw in the same way as they stack it for fuel was the subject of special propaganda. The Chiefs' orders to delay the grazing of stubbles were reasonably well carried out, and were appreciated by stock-keepers, owing to the absence of grazing resulting from the drought. This practice assists greatly in enabling the Instructors to supervise the collection of straw for bedding over a number of months instead of only a few weeks. Manuring of fields in Sukumaland was especially good in south Shinyanga, south-west Maswa and parts of Nyanza Federation. There is no doubt that the wide use of the wheel will give this practice great impetus. The sale of wheelbarrow wheels on to which cultivators can easily build rough bodies is very probably the answer.

Certain soils in east Maswa do not lend themselves to ridging, and gangs of Instructors were engaged throughout the dry season dividing the lands up into thirty-yard strips of arable, and five yards of grass. Lines of aloes are used to mark the strips. Although I think the will was there more than in past years the very difficult season did not encourage the practice of the best methods of farming.

Eradication of Weeds.—Little progress has been made with investigations on the control of the two coarse grasses which have invaded the pasture lands of North Mara, namely *Pennisetum Catabasis* and *Aristida Adoensis*. Land has been selected for the trying out of numerous grazing treatments, but fencing material is awaited. The Pasture Research Officer investigated the matter on the spot.

With regard to the *Opuntia* menace in the North Mara and Musoma districts, the Entomologist proposes to send pads to South Africa to test the effect of the parasites there.

Striga was even less severe in 1949 than in 1948 owing to the dry conditions.

WATER CONSERVATION

In Biharamulo the early planting of tobacco seed beds is dependent on supplies of water from wells. The populace appear to be indifferent to improving supplies for domestic purposes, and it is probable that Government will have to encourage them to improve these supplies for the sake of the tobacco industry, indirectly supplying them with better drinking water. Some wells have already been dug.

In Musoma twenty tank dams were built during the year by the Native Authorities, whilst in North Mara water development is being carried out according to plan by the Native Authority Development Officer with two D.4 tractors and scrapers. The provision of water supplies in new bush areas needs careful consideration, at least in east Sukuma. Settlers tend to anticipate water supplies and settle in advance of the organization. On Ukerewe Mainland two tank dams were completed.

Sukumaland Development carried out a comprehensive programme of dam-digging in co-operation with the Native Authorities, and District Administration. It was not possible to use Sukumaland Development's dam digging equipment as it was incomplete.

As regards the rice dam programme, it is intended to provide water to carry rice over dry periods. One such dam was completed eleven miles south of Mwanza. Assistance was given by Sukumaland Development with the loan of a tractor. Ox-drawn dam scoops were used as well, but required a lot of supervision, and did the work very slowly. They form a useful supplement to a tractor unit, however.

LAND UTILIZATION PLANNING

Sukumaland Development Team's executive functions lie particularly within the pilot schemes for which *pro formæ* are prepared and agreed to by the Provincial and District Teams. In many cases fact finding and preliminary elementary rehabilitation work only has been undertaken, owing to lack of Field Officer Staff. The Bukumbi "Concentration of Staff" pilot scheme has been staffed by an Agricultural Assistant, three Agricultural Instructors, and five Native Authority Instructors. The advantages of concentrated effort are already manifest. The building of rice dams is being concentrated in this area under the supervision of the Agricultural Assistant, and the supplementing of any labour on these work by the assistance of tractors may exemplify the fifty-fifty basis on which we hope many schemes will be founded.

EXPANSION AREAS

Consideration has been given to the development of the hinterland areas of Bukoba district, and a proposal for financing this, with particular reference to the introduction of livestock, has been submitted to the Bukoba Native Coffee Board. The areas round Lake Ikimba are steadily developing, but require something more than limited African effort.

The re-settlement of families from the overcrowded Majita Peninsula in the cleared areas in and adjacent to the Suguti Valley is proving most successful. There are now 1,361 families where a few years ago there were none. Blocks are measured and capacity assessed. The Crop Supervisor and Land Bailiff stop settlement as soon as the maximum is reached.

Block eleven of the Tsetse Research Department's experimental area has been handed back to the Sukuma tribe, and planned re-settlement is being undertaken. There is still no control over stock numbers, and until there is, and Block eleven is an instance, no planned settlement can be really satisfactory.

The Sleeping Sickness outbreak in the Buchosa Chiefdom precipitated what we anticipated might become a dangerous situation owing to the absence of Sukumaland Development Field Staff to supervise new settlement, and to prevent settlement outside the perimeter of the old Sleeping Sickness concentrations. This Department and Sukumaland Development co-operated in resettling the population in the infected area on a plan. Extra care will have to be taken in the distribution of population in any new settlements in Geita district.

DEVELOPMENT OF SUKUMALAND

Numerous functions of the "Team" have been mentioned in other sections of this Report, indicating that there is close contact in many aspects of our work. We have again received great assistance from them, not only in testing out tractors and implements, but in taking over the new tractors of the Cotton and Food Production Scheme until its staff arrived. The Busiha and Buduhe "ibushi" Soil Rehabilitation Area has experienced a very bad year, and owing to our inability to control stock numbers and stock movements, the tempting appearance of the control area was its undoing. It was grazed to the ground, and the drought prevented its revival.

With the encouraging news that Tanganyika Packers would shortly be opening in Dar es Salaam, the Provincial Team were encouraged to draft Stock Restriction Rules which naturally depend on an outlet for culled stock. These Rules necessitate the dividing up of the whole of Sukuma into land usage areas, i.e. self-sufficient units for grass, water and agriculture. Coupled with the acceptance of some form of local rate by the Native Authorities the knowledge that we have a basis on which human and cattle densities can be controlled gives us hope for the future. We have battled through a maze of other problems and find that the real problem is the control and restriction in movement and numbers of stock.

TRAINING OF AFRICAN INSTRUCTORS

It is gratifying to report that by February, 1950, the new Ukiriguru Agricultural Training School for African Instructors will be complete. The buildings are worthy of the importance of their function. Twenty-five acres of farm are attached to the School. Demonstration fields on which the students work are laid out on each of the main soil-types. A model school garden has been laid out, and planted by the student teachers of the Education Department. Twelve cattle have been purchased, so that manure can be made, the cows milked, and all demonstrations undertaken. The Headmaster erected three £600 European quarters at Ukiriguru for school and field staff.

The Headmaster has divided the syllabus into Higher and Lower Standards, and is in the process of re-writing the lectures accordingly. There were one hundred and eight students in residence at the end of the year, of whom eleven were teachers from the Education Department or Missions attending the course. Ten men from the Lake Province, and forty-two from the rest of the Territory completed their course at the end of July.

I am confident that after moving into the new school buildings there will be considerable improvement in both the atmosphere, and quality of the teaching, and perhaps the quality of the product. Two short courses of a fortnight's duration were held during the school vacation at Ukiriguru, partly for the benefit of the new recruits to the Cotton Board. One hundred Departmental Instructors also attended, and benefited by the Course.

PESTS AND DISEASES

As a result of successful tests with D.D.T. spraying, the Bugufi Coffee Co-operative Society agreed to expend up to £1,000 per annum to control *Antestia*. It is too early to say what success has been achieved in terms of crop, but appearances are encouraging.

Cassava Scale has spread rapidly during the year. Whilst most severe in Ukerewe, in Mwanza district it has also caused concern. The Entomologist is investigating the pest, and certain experiments have already been laid down on the Island. A detailed survey of the extent and seriousness of the pest was made by the African Agricultural Assistant. If mature plants are attacked reduction in yield of roots is not considerable, but young plants suffer so much that cultivators in Ukerewe now up-root them, and eat the roots though undeveloped, as the attack of the insect finally makes them quite inedible. This infestation has limited the planting of cassava when it was most needed, and there has been a great concentration on sweet potatoes, which are an annual crop and not a standby.

The Agricultural Assistant, Kwimba, successfully conducted a campaign against porcupine in order to encourage the planting of cassava. He has worked out a technique, and plans to free the district of porcupine next year.

It was decided not to use Ukerewe Island as an isolated multiplication area for new cotton strains owing to the risk of bringing Pink Bollworm to the Mainland.

DEMONSTRATION

The Department in Bukoba has succeeded in enlisting the help of four or five coffee growers in every village who are willing to carry out advice regarding mulching, spacing, regeneration, handling and pest control, maintaining their plots as demonstrations in return for a small gratuity every year. The results of this plan are still under observation.

EXPERIMENTATION

The Lubaga Experimental Station, now a sub-station of Ukiriguru, with a seed farm attached, was managed by the Agricultural Assistant, Shinyanga, in addition to his district duties. This is the last year for it to be run on a "Farm Fund Account" of the Native Treasury. In future it will be entirely financed by Government.

Building at Maruku Experimental Station at Bukoba proceeded slowly. African Staff houses were completed and a ram installed in the stream. Grazing paddocks were laid out, and also a banana establishment experiment. A fertile area for a nursery was cleared and planted with bananas. Some out-houses were erected. The building work is being done by the Public Works Department.

Nine varieties of soya bean from the United States of America were tested in Bukoba, and the trials are to be repeated.

The three successful rice experiments in Mwanza district again demonstrated that Kahogo—which is to replace Afaa—is as good as Afaa. The goat experiment sited at Lubaga on fifty acres of newly-cleared land proved how efficient are goats in keeping down regrowth. This piece of land has now been ploughed up in order to provide a large area of *Cenchrus Ciliaris* (African Foxtail Grass) for seed purposes.

The Native Treasury Seed Farm at North Mara produced over seven tons of seed for distribution. Chickpea and cotton have, as expected, proved quite unsuited to that climate. The *Aristida* plots which were treated with manure from infected areas, and grazed by cattle fed in *Aristida* areas did not indicate that the grass is distributed in this way.

The work at Ukiriguru Experimental Station can best be summarized in the Chief Scientific Officer's own words :—

“With bulrush millet as the crop there were increases at Ukiriguru in two resting crop trials in their fifth cropping year, but the responses in two other trials in their third cropping year were not significant.

Cotton, in the first cropping year, after a planted grass-legume fallow of three years' duration, showed a thirty-one per cent increase in yield over the control which was continuous unmanured cropping; but there was a yield decrease following a tumble-down fallow. In the same trial a dressing of three tons per acre of compost gave an increase of sixty-four per cent; a dressing of 300 lb. single superphosphate gave a seventy-one per cent increase. These are striking responses.

Good fourth year residual manurial results were obtained with cotton as the crop. The highest yield was an increase of thirty-six per cent over control from a seven-ton per acre dressing of farm yard manure applied five seasons previously. There was a similar residual response from the cotton seed ash, also applied five seasons previously.

The pointers are that phosphate is probably the nutrient mainly concerned in these residual manurial responses at Ukiriguru.

In a season when Jassid attack and Bacterial Blight were unimportant, U.K. 48, the constituent strains, and sub-strains from them, showed on the whole satisfactory increases in yield over MZ. 561.”

The rainfall distribution at the Station was far the most difficult in the eighteen years during which records have been kept. The cotton yields were about two-thirds of those which can be obtained in a good season. The following results of tie-ridging from the station are of interest. Cotton on good ridges tied yielded as 182:100, compared to contour ridges not tied (control yielded 312 pounds seed-cotton per acre.) In another experiment the yield of bulrush millet on the contour not tied was only at the rate of ninety pounds per acre—to all intents and purposes a failure—and on the ridges tied 304 pounds per acre, in the ratio of 100:338. At Lubaga on the hard pan soil “Ibambasi”, under cotton flat compared to three feet ridges tied, compared to four feet ridges tied, showed 100:133:151; the control yield being 305 lb. seed-cotton per acre. On the sorghum portion of the trial the contrast was 100:264:324; the control yield being 136 lb. per acre.

Uzinza was favoured with better rains than most places, and the cotton strain trial there gave the magnificent average yield of 2,000 lb. of seed-cotton per acre. The best strain trial in Ukerewe Island was yielding 1,200 lb. per acre, whilst the other district strain trials on the Mainland and hinterland were considerably lower, varying from 400 lb.—600 lb. seed-cotton per acre.

PROPAGANDA AND CONTACT WITH THE PEASANT

As the Instructor staff is increased in numbers by the addition of recruits under the Cotton Scheme, so contact with the peasant will be closer. Unfortunately a proportion of this staff will be under the supervision of new Agricultural Assistants who will take some time to find their feet, and the results will not be as immediate as we would like. Moreover, these new African recruits must get some initial training, if only of a few weeks' duration.

Both in Maswa and in Bukumbi concentrated supervision has been giving good results, and I am convinced that one Instructor per parish will lead to a big step-up in production.

Mass literacy classes were started in Ukerewe with the original intention of teaching all ages how to read cotton price reckoners. They developed, as had been hoped, into open-air classes in charge of voluntary teachers. A minimum amount of equipment was provided from Agricultural Department funds. This is a good start, but may die without vigorous support from both the populace and the Government.

GRADING AND MARKETING

In Bukoba, experiments continue to determine the efficacy of bulk grading as compared with the arduous bag grading practised at the moment. The Coffee Grader has graded nearly 150,000 bags of coffee, and 30,000 bags of pulse during the year. In Shinyanga Instructors did a rough preliminary grading of gum at the markets.

The Nyamirembe Native Tobacco Board functioned satisfactorily under the care of the Manager, Mr. McGregor, the Tobacco Officer. A new tobacco factory should be completed early in 1950 at Nyarumbugu. Up to the present we have had to discourage new areas in other districts from producing tobacco, owing to insufficient space on the grading floors. The Board entered into a three-year contract with the East African Tobacco Company for the sale of its tobacco at the same price as was paid this year.

The Bukoba Native Coffee Board have continued to pay the same fixed price for coffee as in 1948, i.e. forty cents per pound for Robusta, and forty-five cents per pound for Arabica hulled coffee. The machinery for the coffee hulleries has arrived, and it is hoped that a contractor will be found to start building them early in 1950. Seven primary societies for the collection of coffee have been provided by the Board with grants and loans for premises and working capital respectively. A development scheme with wider scope than the original one, for which a £1 per ton levy was voted, has been submitted to the Board for consideration. A Field Officer and African staff are now working for the Board, and are in close contact with the Agricultural Officer, who supervises the technical work.

The cotton crop was marketed without incident. The cotton Rules were tightened up and more buying posts were established, and at some of them two buyers were provided. There is still insufficient permanent storage for seed-cotton both at posts and at the Gineries, and this results in deterioration of seed-cotton. The matter has been taken up with the Ginners.

This Department is still investigating the best type of weighing machine, and it is hoped that a 250 lb. platform scale will be available for each of the two-hundred and nine cotton buying posts in 1951.

Co-operative societies are in process of being set up in the North Mara district for the sale of maize and other produce.

In Biharamulo groups of producers were formed to give their views to their representatives on the Tobacco Board. It is hoped that later these will develop into co-operative societies.

Each coffee zone in Bukoba has its own African representatives of the growers, who meet the Manager to the Board from time to time and who are responsible for transmitting information to their areas. It is intended in future to get these representatives to attend meetings of the Board, for knowledge of the Board's activities by the grower is all important at this stage.

IMPLEMENTS

Owing to the bad year few ox-ploughs were sold in Sukuma, but there was no diminution in sales in North Mara. Great progress will be made with popularizing the plough when light soils can be tackled with a suitable ridger. An implement firm is in process of making a prototype mould board for trial. A consignment of fifty wheelbarrow wheels has been received from South Africa, and issued to officers with instructions to sell some of them with rough bodies attached, and others unassembled. The price is Shs. 20/- each, including bushes, but this can be reduced with larger orders.

Turning to heavy equipment, demonstrations have been given; one was performed at Ukiriguru with a proposed repeat in 1950, in the dry season, and the others in Bukoba and Mwanza. Whilst there are no immediate buyers for heavy machines, as soon as our experiments have progressed, thought will have to be given to the type of tractor from sterling sources which will be suitable for group farming.

CROP SURVEYS

The Crop Yield Survey of Sukumaland was undertaken and the yields of 3,000 fields were sampled belonging to some 1,000 cultivators. It will be repeated in 1950 and 1951. The figures have not yet been analysed. This will involve the staff in much work, but without this factual knowledge no long-term plans for progress can be made.

GINNERIES

The Ginnery Inspector inspected all Ginnersies in the Lake Province, and in the Kilosa and Morogoro areas. He was kept very busy during the season owing to numerous cases of bad ginning.

The Department has purchased an air-blast saw gin for trial at Ihale Ginnery. The Ginnery Inspector has now almost completed the erection of this gin, but the intermediate shafting and pullies have not yet arrived. Some seed-cotton has been reserved for a preliminary test before next season. The general condition of the gins in the Lake Province is very poor, and labour is becoming increasingly difficult to obtain. So, for many reasons, if saw ginning does not damage the quality of the lint, it may be beneficial to change over at this stage.

CONCLUSION

Looking back on the past three years, whilst slow progress has been made in improving agricultural methods, the main work of this department, other than routine extension, has been in preparing the ground, finding facts, and gathering staff and machinery together. This will continue into 1950, for all the European staff and additional African staff for the Cotton Scheme has still to be gathered together. Shortly this gathered force is to be put

into action, and with new personnel this is not going to be easy, hence the importance of the preparatory work. Entirely new ground is being covered by the introduction of mechanical ploughing to the cultivator. A few thousand of them have seen what it means. It remains to work out the best way of introducing it to them as groups and not as individuals. The Lake Province Council and the various Boards are encouraging a more general interest by the public in the work of this department, in particular as regards the Cotton and Food Production Scheme, and the work of the Boards, and everything must be done by the staff to make them a success. The African staff must be made to realize that we are on trial too.

It has been a most depressing year for production, and although a very fair production of cotton was achieved, the acreage was the highest ever reached, and with fair rains should have produced a record crop. Famine was inevitable without importation of food, but happily, excepting for the undertaking of famine surveys, the staff were able to continue with improving methods of agriculture. Nevertheless, the food shortage has disorganized district staff, and disturbed the population, with resultant diminution in their capacity to adopt what is taught to them. A heavy task which has still to be, and in my view, must be undertaken now, is that of assuring the people against food shortage, by food storage. In bumper years this will be easy, in lean years mechanization will be a help. Until this is done, however, development is on unsound and uneconomic foundations. Little progress has been made in getting the producer organized, and in lighting the spark of initiative in the rural populations. It will be some years before this can occur on any scale, for the new personnel will have to accommodate themselves to Africa. In the meantime we can press on with "better farming" by hand and machine, which will slowly result in higher production per acre.

N. V. ROUNCE,
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SOUTHERN HIGHLANDS PROVINCE

WEATHER

The driest season on record caused many difficulties for farmers. The higher altitude areas were better favoured generally with good rains, but the low-lying areas such as Usangu and Pawaga, suffered severe drought and consequent loss of crops. This resulted in food shortages and famine in localized areas. The recorded rainfall at various stations in the Province was as follows :—

		1945		1946		1947		1948		1949
		Inches		Inches		Inches		Inches		Inches
Iringa	...	35.79	...	21.36	...	34.76	...	26.80	...	15.76
Njombe	...	45.70	...	38.19	...	43.10	...	45.10	...	26.35
Tukuyu	...	129.33	...	79.15	...	109.81	...	95.74	...	79.45
Mbeya	...	39.57	...	37.40	...	37.87	...	37.05	...	26.05

AFRICAN-GROWN CROPS

Maize.—Maize is the staple food of the Province and the crop was a poor one on account of poor rainfall. The amounts purchased in markets and available for the feeding of labour were quite inadequate for provincial needs,

with the result that importation of maize was necessary from outside the province during the last months of the year. The price of such imported food-stuffs is very high, and where production of economic crops entails the feeding of employed labour, this high cost of "posho" has very adverse effects on production. Sales in the markets during the past five years were :—

1945	1946	1947	1948	1949
3,144 tons ...	3,270 tons ...	8,002 tons ...	8,564 tons ...	4,935 tons

Rice.—Paddy purchases in the Rungwe District amounted to 3,664 tons to the end of December, 1949, which is a very good result considering the adverse weather conditions. Transport difficulties, as usual, prevented quick evacuation from the producing areas. The resulting congestion caused growers to dispose of some of the crop outside the Territory.

Other rice-producing areas in Usangu and Pawaga produced very poor crops indeed as a result of a very bad season. Purchases during the last five years are as follows :—

1945	1946	1947	1948	1949
1,154 tons ...	2,821 tons ...	3,382 tons ...	2,475 tons ...	3,664 tons

Beans and Peas.—The demand for these crops far exceeds the supply and the bad season resulted in very poor crops. Increased production has been encouraged with little effect. Sales are :—

1945	1946	1947	1948	1949
298 tons ...	245 tons ...	625 tons ...	709 tons ...	350 tons

Eleusine.—Like other crops eleusine failed through lack of rain. The destruction of land caused by bad cultural practices with this crop is well known. For this reason we do not wish to extend cultivation of eleusine, and where producers insist upon growing it, it is necessary to devise a means of cultivation which will be less destructive of good land. Market returns show the following purchases of eleusine and sorghum :—

1946	1947	1948	1949
153 tons ...	209 tons ...	460 tons ...	266 tons

Wheat.—Production of wheat by Africans is increasing. So has consumption of wheat by Africans as a food. For this reason little is offered for sale.

Root Crops.—In general the quantity of root crops planted in the Province is very inadequate, particularly in areas of marginal rainfall. Attempts to increase the production have not been very successful. Africans are not keen to plant these crops despite their obvious advantages. Efforts to popularize these crops continue.

Sunflowers.—This crop is grown throughout the Province. It is doubtful if the acreage will be maintained. It might have proved a useful rotation crop but unfortunately it is very susceptible to Nematode. Purchases in Mbeya District amounted to 375 tons, in Iringa District to 656 tons and in Rungwe 7 tons—a total of 1,038 tons for the Province.

Vegetables.—The cultivation of European-type vegetables is very widespread amongst the Africans and more especially in the Mporoto mountains of Mbeya and Tukuyu where they are increasingly being consumed by Africans themselves. Specially reduced freight charges for transport of vegetables by air were introduced during 1949. Sales were (African and non-African combined) :—

Iringa	Mbeya	Total
710 tons ...	126 tons ...	836 tons

Beeswax.—Twenty-four tons were collected and exported.

Jaggery.—Production of sugar cane is almost confined to Usangu flats where a small production is crushed by two small mills operating in that area.

European Potatoes.—The bulk of this crop is produced in the Mporoto mountains of Mbeya and Tukuyu, and smaller quantities in Mbosi, Mufindi, Dabaga and the Njombe highlands. The quality is moderately good and exports from Mbeya District amounted to roughly 1,000 tons.

Coffee.—The African-produced crop of Mbeya and Tukuyu Districts was a record, amounting to 374 tons; this may be considered satisfactory in such a dry season. Obviously the scanty rainfall was well distributed in coffee growing areas. Production during the past five years was as follows :—

		1945		1946		1947		1948		1949
		Tons		Tons		Tons		Tons		Tons
Rungwe	...	194	...	147	...	194	...	370	...	374
Mbosi	...	54	...	9½	...	32½	...	32	...	60

FOOD SUPPLIES

The excellent harvest obtained in 1948 caused a general slackening of effort in 1949. This factor and the poor rains led to general shortage of food-stuffs in 1949. In the rain-shadowed areas of Pawaga and Usangu food supplies were totally inadequate and food shortages prevailed. These were dealt with by supplying food from elsewhere within the Province. In other areas supplies were generally sufficient, but there was little surplus for sale and consequently supplies for fed labour were inadequate. Towards the end of the year maize for the feeding of employed labour and of urban dwellers had to be imported from the Central Line at great expense. This was sold locally at Shs. 45/- per bag of 200 lb.

ESTATE-GROWN CROPS

Pyrethrum.—Renewed interest in this crop led to the opening up of farms which had been allowed to revert to weeds. Production was as follows :—

		Dabaga		Njombe		Sao Hill		Mbeya		Uwemba
		lb.		lb.		lb.		lb.		lb.
January	...	484	...	263	...	—	...	15,129	...	21,094
February	...	11,997	...	830	...	177	...	2,333	...	58,077
March	...	23,324	...	863	...	1,167	...	7,467	...	33,796
April	...	6,626	...	739	...	761	...	—	...	5,615
May	...	1,634	...	505	...	—	...	11,033	...	5,261
June	...	594	...	146	...	—	...	—	...	7,768
July	...	1,579	...	—	...	—	...	3,630	...	4,339
August	...	1,946	...	—	...	125	...	—	...	10,627
September	...	1,974	...	179	...	—	...	—	...	13,475
October	...	9,419	...	—	...	—	...	854	...	49,391
November	...	3,986	...	—	...	—	...	4,221	...	36,169
December	...	6,047	...	—	...	—	...	10,704	...	669
		69,610	...	3,525	...	2,230	...	55,371	...	246,281

Total ... 377,017 lb.

Tobacco.—The tobacco crop amounted to 1,700,915 lb. There can be little doubt that the variety Ehlers has proved a great boon to the Iringa District. It yields well, is easily cured, colours readily and is fairly tolerant of varying conditions. It is also very disease-resistant. It is the only type so

far found suitable at the higher altitudes. It has the characteristic tang of most African tobacco, about which we hear so much from the buyers, but it appears that with use the British smoking public are becoming gradually accustomed to it. The crop was moderately good considering the dry season, but the total figure does not compare strictly with that of the previous year, because it includes a great deal of rubbish which was marketed this season and which was not acceptable last season. The Mloa area for which great hopes were held out last year, has not come up to expectations. It was much less favoured by the scanty rains than other areas, and such tobacco as was produced, proved to be very difficult to cure and was offered in a green and unattractive condition.

Matters of crop hygiene both in the field and in buildings tend to be neglected. The uprooting order was fairly closely observed but was too late in the season to give an effective close season. In and around buildings used in the handling of tobacco there is far too much tobacco waste which should be made into compost or burnt. One lot of tobacco kept over from the previous year was found to be infested with tobacco beetle. Legislation to control this pest is under consideration.

Grading and Processing.—The annual problem of how to grade and process the crop in inadequate buildings was reduced by instructing growers to grade their own tobacco. The problem of variation within any one grade was overcome by the device of blending one grower's tobacco with that of another. Such methods can never secure the best possible prices for the crop and a new system of grading has been recommended for adoption by the Board. They have also been advised to plan their building programme in such a way that the needs of the next five years may be met instead of planning for one year only as has been done in the past, and then finding that the buildings were inadequate to handle the following year's crop. The following was the total crop in grades :—

Grade	Processed weight at shed lb.	Per cent	Total weight sold for local manufacture lb.	Per cent	Total weight lb.	Per cent of total weight
1.	2,016	·19	4,547	·70	6,563	·38
2.	7,210	·69	23,533	3·60	30,743	1·80
3.	29,700	2·84	75,141	11·40	104,841	6·13
4.	17,791	1·70	14,077	2·10	31,868	1·86
5A.	197,255	18·84	192,954	29·10	488,837	28·57
5B.	98,628	9·42	—	—	—	—
6A.	138,402	13·22	250,717	37·80	557,561	32·59
6B.	168,442	16·09	—	—	—	—
7A.	37,177	3·55	72,039	10·60	183,569	10·73
7B.	74,353	7·10	—	—	—	—
8A.	15,210	1·45	15,767	2·40	91,818	5·37
8B.	60,841	5·81	—	—	—	—
10B.	1,786	·17	1,644	·30	3,430	·20
10D.	105,630	10·09	6,027	·90	111,657	6·53
10G.	10,610	1·01	—	—	10,610	·62
B.X.	6,535	·62	7,190	1·10	13,725	·80
M.X.	32,770	3·13	—	—	32,770	1·92
D.X.	42,824	4·08	—	—	42,824	2·50
	1,047,180	100	663,636	10	1,710,816	100

Prices for leaf for local manufacture were from Shs. 2/20 to 50 cents according to grade and for export from Shs. 2/70 to 65 cents.

General.—The formation of the new company, The Southern Highlands Non-Native Tobacco Growers' Union Ltd., to handle all tobacco in the Southern Highlands was completed during the year and it undertook the marketing of tobacco which was not contracted for. Tobacco has been sold on consignment by the Union. There have been few complaints about the quality of the tobacco. This is not surprising because the present markets are prepared to absorb almost any type of tobacco. The marketing of scrap tobacco cannot be regarded as a good advertisement for the Irunga tobacco industry. This is but an indication of the tightening up of quality standards which is so essential if the industry is to last beyond the period of the present tobacco shortage.

Nicotiana Rustica.—High Nicotine content tobacco has been planted extensively at both high and low altitudes. Yields have been very variable, depending on local conditions.

Coffee.—Estate-grown coffee produced an excellent crop. Over 300 tons were exported from Mbeya District alone. Production during the past five years was as follows :—

1945	1946	1947	1948	1949
305 tons ...	60 tons ...	285 tons ...	194 tons ...	346 tons

Mbosi, Mbeya District, and Lupembe, Njombe District, are the only two areas in which estate-grown coffee is produced in quantity.

Tea.—In a season of exceptional drought tea production has suffered severely. Total production amounted to 464,640 lb. in Rungwe District and 536,492 lb. in Mufindi area. Attempts to protect the soil of Mufindi tea areas against exposure to the sun and drought have been severely hampered by the poor rainy season. One estate made strenuous efforts to obtain grass cover for mulching in tea, and to re-afforest considerable areas where the rainfall is insufficient for the tea plant. Unfortunately they have been somewhat discouraged by the fierce bush fires which have been destroying not only the grass which they had so carefully preserved, but also large areas of tea plants, bluegums, wattle, etc.

Maize.—The poor season was reflected in the very poor crop obtained. Yields in some cases were nil. Because of this, the demand for African-grown maize as food for labour has been very great and supplies totally inadequate. Tobacco planters, as in the past, had been required to plant maize acreage equal to the tobacco acreage. Sales during the past four years were as follows :—

1946	1947	1948	1949
2,459 tons ...	2,881 tons ...	2,055 tons ...	1,289 tons

Wheat.—Little interest has been shown in this crop. The need for expensive machinery to handle it makes it compare very unfavourably with maize as an estate crop. Also the yields are usually far below the yields of maize so that in the absence of a price inducement, maize is preferred. Towards the end of the year it was announced that the price would be increased. This led to the alteration of programmes of production in favour of wheat. Some 3,200 acres are scheduled for planting in the coming season.

Manurial and variety trials were carried out at some farms. Results were inconclusive except in so far as the season showed up the drought-resistant varieties.

Manurial trials were inconclusive but there were indications that suitable quantities of lime give significant increases in yield in a dry season. Experimental work with wheat has been extended and work approved for the coming season under the supervision of the Agricultural Officer (Experiments). In Mbosi area of Mbeya District the Department is indebted to Mr. S. M. Gilbert for the carrying out of wheat trials. Unfortunately the results were inconclusive because of the very dry season.

Vegetables.—Vegetable production has been considerable. Supplies have been sent to Kongwa and the Southern Province. Transport to the latter area has been by air. Dar es Salaam has also been supplied to a limited extent with vegetables.

European Potatoes.—A good crop was secured and the dry season did not encourage disease. The blight-resistant variety 833b (98) was multiplied at Ifuenga. The whole of the crop was retained for replanting and multiplication. Inspection has not revealed any disease so far.

Sunflowers.—Plantings with this crop were not extensive and general dissatisfaction with prices led to reduced production.

Seed Production.—There is increasing interest in the production of seed peas amongst planters at Uwemba, and onion seed amongst other planters. Some interest is also being shown in the production of flower seeds.

Essential Oils.—Production of Geranium and other essential oils is on a small and experimental scale. So far there has been no significant advance. This experimental production is confined to Uwemba farmers.

Fruit.—Significant quantities of fresh fruit, plums, peaches, etc., are produced principally in Dabaga area of Iringa District. Appreciable quantities will be available for canning. Even in a fresh state something like 100 tons is handled in a year.

MARKETS AND MARKETING

The marketing system of the Province operated smoothly. As usual, the rice markets could not be opened early because of the inability of the transport organization to remove the previous crop. Produce markets in the Mporoto mountains were not opened until late in the season for the sale of maize, so as to allow for the proper drying out of this commodity. The following are the figures of produce marketed during the year :—

PRODUCE MARKETED, 1949. (IN TONS OF 2,240 LB.)

	Iringa	Mbeya	Rungwe	Njombe	Total
Maize, African	1,340	2,148	258	—	3,746
Maize, estate	989	210	—	90	1,289
	2,329	2,358	258	90	5,035

				Iringa	Mbeya	Rungwe	Njombe	Total
Beans	...	...	...	—	181	32	—	213
Mixed pulses	...	...	...	54	—	8	—	62
Peas	...	...	...	—	75	2	—	77
Sorghum and Millet	...	...	...	—	266	4	—	270
Wheat	...	...	...	60	35	—	—	95
Sunflower	...	...	...	656	375	7	—	1,038
European Potatoes	...	...	...	113	1,000	6	—	1,119
Onions	...	...	...	—	60	8	—	68
Vegetables	...	...	...	710	126	—	—	836
Paddy	...	...	...	6	—	3,664	—	3,670
Coffee, African	...	...	...	—	60	314	—	374
Coffee, estate	...	...	...	—	346	—	—	346
					406	314		720
Pyrethrum	...	...	...	32	25	—	111	168
Tea	...	...	...	239	—	208	—	447
Tobacco, flue-cured	...	...	...	752	—	7	—	759
Beeswax	...	...	...	10	14	—	—	24

Comparative figures for the past four years are:—

	1946	1947	1948	1949
Maize	3,270	8,002	8,564	5,035
Paddy	2,821	3,367	2,475	3,670
European Potatoes	244	618	595	1,119
Beans and Peas	244	625	709	352
Wheat	98	50	98	95
Coffee	156	610	596	720
Sunflower	—	315	1,300	1,038
Vegetables	—	260	966	836

PESTS AND DISEASES

Coffee

White Borer is widespread, but generally under control on all estates. Specially trained gangs are steadily employed collecting and destroying this pest.

Thrips.—There have been no reports of serious damage by thrips.

Hemileia.—The dry conditions did not favour this disease. It is present on most estates but kept under strict control by spraying. On African coffee no spraying was carried out and heavy defoliation takes place every year.

Dieback.—This trouble has been more widespread than usual and it would appear that drought is partly responsible, though this is not the whole problem.

Antestia.—Damage has been noted but is generally under control on estates.

Tea

Armillaria.—This disease is present in tea particularly in Rungwe area, but caused no serious damage beyond what may be regarded as normal.

Tea Yellows can be observed at any time in the Rungwe District but readily yields to treatment with Sulphate of Ammonia. Other tea diseases as reported last year have been observed but nothing has been serious.

Pyrethrum

The seasonal attack of *thrips* was observed; otherwise pyrethrum was free of pests. A bud rot disease has been noted and is under observation.

Tobacco

Nematode.—This pest is widespread throughout the tobacco lands of Africa and it can hardly be expected that Iringa can escape it, since there are a multitude of wild hosts. Even the newly-opened areas of Mloa which had not previously carried a tobacco crop, have shown a heavy infestation of Eelworm.

Cutworm.—In valley lands severe damage has been caused by cutworm.

Whitefly was present as in all seasons, but caused little damage.

Leaf Curl.—There was little evidence of this disease in Iringa District.

Mosaic.—This was very little in evidence.

White Rust was observed in the nurseries towards the end of the year.

Kromnek is still under investigation. It was not observed to be severe during the past season.

Angular Spot was observed but not in a serious degree.

Red Rust was observed on White Stem and Bonanza varieties.

General.—Freedom from serious diseases of the tobacco crop can be attributed in part to the dry season, but also in large measure to the disease-resistant qualities of the variety Ehlers.

Maize

Stalk borer, cutworm, baboons, monkeys, pigs, rats, partridges and guinea fowl took their usual toll of the maize crop. There is no close season for maize and so little hope of controlling pests by that means.

Potatoes

Late Blight was observed but the ravages of this disease were not severe because of the dry season.

Wheat

The usual rusts and smuts were observed, but the damage was not serious due to the dry conditions.

SOIL CONSERVATION

Experience in this Province has been parallel to that in other areas. Those who have first become erosion conscious are those who live densely settled on fertile land, and where good new land is unobtainable. In such areas the loss of productive soil would therefore be an irreplaceable loss.

Most progress is to be recorded in the densely settled highlands of Tukuyu. In that area erosion control measures are taken as a matter of course. Erosion caused by cattle is also being tackled.

Erosion control is less satisfactory in the Mporotos area of Mbeya District where contour banks constructed in one season are broken down in the next as a control measure against rats and couch grass. In the other settled areas of the Province where it is still possible to obtain virgin land when old fields will no longer produce crops, erosion control is much less satisfactory. Propaganda seems to have little effect and demonstration is largely disregarded. The worst erosion factor is the method of cultivating eleusine.

Bush Fires.—Bush fires are very serious factors in causing soil erosion, and control of such fires is one of our major problems. It is considered that the only practicable control measure is for all (chiefs, sub-chiefs, jumbes and followers) to get together and decide which areas shall be preserved. Such areas shall include thatching grass, grazing reserves, township areas, forest reserves, water sheds, stream banks, etc. Having decided to preserve these areas they will then proceed to burn all the unwanted areas at a season when it is unlikely that the fires will get out of control.

During the past season bush fires have been particularly destructive following the poor rainy season.

EXPERIMENTAL WORK

Experimental work in the Province has been confined mainly to Mbeya District :—

Mbosi Coffee Sub-Station.—The coffee variety trial Experiment I (six varieties—E 59, F 839, N 69, P 280, F 689 and P 35, in 4 Latin squares) was maintained, trenching being done in the alternate rows of coffee, and weeding and cultivation as necessary. Pigeon peas were planted around each plot to give greater protection from wind and sun to the young coffee. A final replanting of the very weak and unprogressive plants was done during April. The whole experiment was mulched in June and young plants were shaded and watered during the dry season as required. Early in the year Tangasale shade trees and the coffee guard rows were pruned. Young plants were topped at 15 inches in August. Nine pickings of coffee were made from the guard rows and 103½ “debes”* of cherry were obtained, of which 26 “debes” were distributed to the Native Administration Coffee Farms Scheme and local planters and the remaining 77½ “debes” were sent to Mr. Allan for pulping and drying. Some nine acres of the new extension area on the opposite side of the road was prepared and sown to wheat varieties 117A and 192 on 28.2.49 and 1.3.49 for a soil variability test; in July marking out and holing for two new experiments commenced (Experiment II is a spacing trial and Experiment III is to investigate methods of establishing young coffee). These two experiments were planted on 27.12.49 and 31.12.49. A regrettable setback to experimental work occurred on 23.10.49 when a grass fire, fanned by a strong wind, penetrated the fire and shelter belts without being observed and set fire to the grass mulch in Experiment I destroying a large percentage of plants in the experiment. It is hoped to obtain sufficient plants from regrowths and material brought from Lyamungu to re-establish at least two of the four Latin squares this season. The nursery received due attention throughout the year. Further seed of most of the 24 selections enumerated in my last annual report was sown, also seed of selections—P 140, P 190, P 313, P 348, F 839, E 59, N 69, F 502 and P 280. A total of 38 compost pits were prepared during the year. Cypress and Grevillea tree seedlings were planted around the outer boundaries of the sub-station. Two hundred and fifty *Eucalyptus maideni* seedlings were planted in a plot adjoining the rest house. A small plot of Elephant Grass was sown near the nursery for multiplication.

The water supply at the sub-station was very difficult this year on account of the very low rainfall. The usual water holes dug in the swamp dried up

* Debe—a four-gallon petrol tin.

early and for a large part of the dry season adequate water was only obtained at a considerable distance from the nursery. For future purposes, particularly in view of the facts that, an Agricultural Assistant is to reside there and that a coffee factory will ultimately be needed, it will be necessary to seek the assistance of the Water Development Department, as it is probable that sufficient water will be obtained by sinking wells in strategic parts.

The following deciduous fruit trees from South Africa, were planted in the sub-station orchard site on 9.8.49 for trial and observation :—

Almond—2 of each of IXL, Paper Sheel, Nonpareil and Drake's Seedling.
 Apricot—Royal, 1.
 Apple—Rome Beauty, 1.
 Peach—Killiekrankie, 1.
 Plum—Beauty, 1.

Of this total, unfortunately, the following were destroyed by fire on 23.10.49 :—

Almond—Drake's Seedling and Nonpareil, 2; IXL, 1.
 Plum—Beauty, 1.

Most of the remaining plants appear to be growing well. Eighteen *Queensland Nuts* were transplanted to the orchard section on 11.11.49 and are growing well.

One acre of *Niger Oil* seed was sown for trial on 8.1.49 and 10.1.49; it was harvested on 24.4.49 and gave an excellent yield of 505 lb. Owing to the rather low oil content of this particular strain it will not be replanted. *Lespedeza* (Korean and Kobe) were again sown for further seed multiplication, as they are well suited to the acid soils of Mbosi and are likely to prove valuable to local coffee planters as a cover and soil improving crop interplanted in the coffee. *Hubam* clover has not shown up very well yet but is worth continuing with. Some of the *Aleurites montana* plants were destroyed by fire, but enough remain for further observation; they have made reasonably good progress during the year. A small plot of *Buckwheat* was sown for trial and multiplication, and a good harvest obtained. Two small plots of *Tropical Kudzu Vine* made very encouraging growth during the year and a small amount of seed was collected; seed and rooted plants are being distributed.

Wheat trials were carried out at Uyole and the Mporotos (near Njiapanda) with the following summarized results :—

Uyole Variety	Date of planting	Date of Harvesting	Yield lb.	Approximate yield per acre lb.
337. BE. 2. F. 2.	28.2.49	19.7.49	124	1,488
B. 256 G.	28.2.49	29.7.49	143	1,716
Regent	28.2.49	1.8.49	123	1,476
Sabanero	28.2.49	6.8.49	106	1,272
318. AJ. 4. AI	28.2.49	22.8.49	130	1,560
318. 03. B2	28.2.49	24.8.49	105	1,260

The above yield figures reflect the very encouraging results obtained from this trial, which will have to be continued for at least one more season before the most suitable variety for local conditions can be determined.

Mporotos (near Njiapanda) Variety	Date of planting	Date of harvesting	Yield lb.	Approximate yield per acre lb.
Sabanero	2.3.49	1.10.49	96½	1,158
Regent	2.3.49	3.10.49	164	1,968
B256G	2.3.49	9.9.49	115	1,380
337. BE2. F2	2.3.49	26.8.49	168	2,016
318. AJ. 4. A. 1	2.3.49	4.10.49	90½	1,086
318. 03. B2	3.3.49	5.10.49	102½	1,230

The above figures reflect even more encouraging results obtained for the Mporotos trial than that at Uyole. The trial is to be continued next season.

N.B.—All wheat plots were of one-twelfth acre size, drilled in six-inch rows. A continuation of these trials on a statistical basis in 1950 is being arranged.

Linseed trials were carried out at the Mbosi coffee sub-station, Uyole and the Mporotos with the following summarized results :—

Mbosi Coffee Sub-station

Mbosi Coffee Sub-station												
			Date of planting	Date of harvesting	Yield (lb.)				Approximate yield per acre (lb.)			
					Rows	Broadcast			Rows	Broadcast		
Rio	...	15.2.49	...	6.7.49	...	25½	...	27½	...	505	...	550
Royal	...	15.2.49	...	16.7.49	...	22	...	17½	...	440	...	350
Punjab	...	15.2.49	...	30.7.49	...	17½	...	15½	...	350	...	310

Uyole

Rio	...	17/18.2.49	...	14.7.49	...	53½	...	51	...	1,070	...	1,020
Royal	...	16.2.49	...	5.8.49	...	62	...	69	...	1,240	...	1,380
Punjab	...	15.2.49	...	12.7.49	...	*7	...	*6	...	—	...	—

Mporotos

Rio	...	18.2.49	...	7.10.49	...	68½	...	64	...	1,370	...	1,280
Royal	...	19.2.49	...	24.9.49	...	89½	...	61	...	1,790	...	1,220
Punjab	...	19/20.2.49	...	15.9.49	...	108½	...	102	...	2,170	...	2,040

*From 20 feet square plot.

The above figures tend to suggest that the Punjab variety is a much heavier yielder than the other two varieties (the Uyole results were unreliable owing to the unsatisfactory planting site chosen for the Punjab variety).

N.B.—All linseed plots were of one-tenth acre size, half sown broadcast, half in rows. A continuation of these trials on a statistical basis in 1950 is being arranged.

Three Native Authority Demonstration Plots each of approximately two acres were commenced at Ndalambo (Unyamwanga) and Utengule and Rujewa (Usangu) with the object of trying out more reliable food crops for these marginal rainfall areas than the staple (maize) at present being grown rather precariously. Three quick-maturing Swaziland sorghums (P. 41, P. 133 and P. 127), Dobbs sorghum and Uwele (Bulrush millet) were sown for trial at the commencement of the rains after each plot had received due preparation. Owing to persistent drought the Utengule plot was virtually a failure, but encouraging results and average yields were obtained from the Rujewa and Ndalambo plots as the following summarized figures show :

Rujewa Demonstration Plot.

Dobbs sorghum	...	...	159 kgs. (.307 acres).
Swaziland, P.133	...	...	120 kgs. (.303 acres).
Swaziland, P.127	...	...	90 kgs. (.303 acres).
Swaziland, P.41	...	...	186 kgs. (.303 acres).
Uwele (Bulrush Millet)	...	...	12 kgs. (.702 acres) due to bird damage.

Ndalambo Demonstration Plot.

Dobbs sorghum	...	...	75 kgs. (.307 acres).
Swaziland, P.127	...	...	21 kgs. (.303 acres).
Swaziland, P.133	...	...	17 kgs. (.303 acres).
Swaziland, P.41	...	...	16 kgs. (.303 acres).
Uwele (Bulrush Millet)	...	...	81 kgs. (.702 acres).

The results obtained from the Rujewa and Ndalambo plots in the face of virtual failure of the maize crop in these areas has aroused a considerable amount of interest in the possibilities of the quick-maturing sorghum as a second string to the local bow, and there is a keen demand for seed. Bulrush millet proved a great attraction to birds in the Usangu area and little crop was harvested; at Ndalambo only slight bird damage occurred and a good crop was obtained. P. 41 seems the most promising of the Swaziland sorghums and as it is the only white-seeded variety more attention will be given to it next season. Arrangements have been made for these trials to continue in the ensuing year and, at Ndalambo, manuring versus no manuring will be tried, as the miombo soils of that area will undoubtedly benefit from annual dressing with manure.

The Iringa Production Committee held eight meetings during the year. The very bad season caused added burdens for farmers and this added to the work of the Production Committee. Maize producers almost without exception had to be paid guaranteed minimum returns in addition to acreage grants because of poor crops. Applications for extensions of loans have been numerous.

GENERAL

In spite of the unfortunate season estate agriculture enjoyed a reasonably prosperous year. Crop yields of tobacco, coffee, tea and pyrethrum were not up to average, but good prices were secured. As these crops were main export crops the producers had a moderate season. Those who were hardest hit by the drought were mixed farmers who depended mainly upon maize to feed their labour and livestock. African agriculture supplied the bulk of the needs of the Province other than supplies for employed labour.

The above does not report a satisfactory season, but no great agricultural disaster has taken place within the Province.

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NORTHERN AND TANGA PROVINCES

WEATHER CONDITIONS

The short rains at the end of 1948 did not break until December and were followed by hot, sultry weather in January. Rains in the early part of February saved the situation but were followed by a disastrous six weeks drought until the first week in April when satisfactory planting rains were experienced. Unfortunately the rains in May were patchy and main rains crops suffered badly in many areas, with the result that localized food shortages occurred in several districts.

MAIZE

The crop was almost a complete failure in all the plains areas owing to the worst drought experienced for many years. In the mountain areas fair crops were harvested but exportable surpluses from most districts were

negligible owing to the need to retain considerable quantities for local consumption. In the Tanga Province there were no sales of African-grown maize and considerable acreages planted by sisal estates were a complete failure. In Moshi District, 4,064 tons were sold from approximately 75,000 acres. African-grown maize amounted to 579 tons and estate maize to 3,485 tons. In Mbulu District the crop was a complete failure. In Arusha District yields were better than expected at first, the African crop amounting to 768 tons and the estate crop 3,393 tons—a total of 4,161 tons. This is only 900 tons short of the record 1947 crop which was a very creditable performance under such adverse weather conditions.

WHEAT

The following are the statistics of production in the Northern Province over the past seven years, exclusive of the Wheat Scheme production :—

Sales of Wheat in tons

<i>African</i>		1943	1944	1945	1946	1947	1948	1949
Moshi	...	219	49	9	20	3	—	—
Arusha	...	448	642	387	112	129	191	95
Mbulu	...	224	136	343	?	142	145	16
		891	827	739	132	274	336	111
<i>Estate</i>								
Moshi	...	298	658	482	477	673	1,145	1,259
Arusha	...	2,033	3,216	2,067	2,277	767	545	3,180
Mbulu	...					545	1,636	
		2,331	3,874	2,549	2,754	1,985	3,326	4,439

The 1949 crop was a record one in spite of the fact that weather conditions were unsatisfactory and in the drier areas the crop was a failure. In other parts where the rainfall was just sufficient to mature the crop it was noticeable that good farmers harvested moderate to good crops whilst their less skilled neighbours harvested little or nothing.

The quality of wheat, on the whole, was good. For the first time a scale of penalties for the presence of *Datura stramonium* in wheat was instituted. Marketing was undertaken, as usual, by the Kenya Farmers' Association, with the Northern Province Farmers' Co-operative handling the payments as sub-agents. The price for first quality wheat was raised to Shs. 35/75 per bag, inclusive of the cost of the bag.

Kenya Governor wheat has declined in popularity except in African-grown wheat where it predominates in the mixture. On estates it has been replaced by some of the more recent selections from the Plant Breeding Station at Njoro. The most popular varieties are strains of 261 and 294, whilst "Regent" 318, 192 and "Sabanero" are also grown on a small scale.

No diseases of wheat were recorded in Arusha and Moshi Districts. Termites and rust caused considerable losses in some parts of Mbulu District.

COFFEE

The following are the statistics of coffee production during the past six seasons :—

Parchment Coffee production in tons

<i>African</i>	1943/44	1944/45	1945/46	1946/47	1947/48	1948/49
Moshi	2,120	3,886	3,102	2,318	4,235	3,216
Arusha-Mbulu	73	198	94	161	194	183
	<u>2,193</u>	<u>4,084</u>	<u>3,196</u>	<u>2,479</u>	<u>4,429</u>	<u>3,399</u>
<i>Estate</i>						
Moshi	988	1,027	1,551	149	1,370	830
Arusha-Mbulu	1,258	1,531	1,441	678	1,265	471
	<u>2,246</u>	<u>2,558</u>	<u>2,992</u>	<u>827</u>	<u>2,635</u>	<u>1,301</u>
Grand Total	<u>4,439</u>	<u>6,642</u>	<u>6,188</u>	<u>3,306</u>	<u>7,064</u>	<u>4,700</u>

All coffee from the Tanga and Northern Provinces was cured by the Tanganyika Coffee Curing Company Ltd., in which the Tanganyika Coffee Growers' Association and the Moshi Native Coffee Board are equal shareholders. The 1948/49 crop was the second crop to be marketed under the five-year contract with the Ministry of Food. The African and estate crop were bulked together and sold under a single schedule. The steady rise in world prices of coffee caused dissatisfaction with the original contract price and there is strong feeling in some quarters that there should be a revision in the contract price in order to bring it into line with world prices. (This has subsequently been negotiated).

The crop did not come up to expectations for although it matured early much of it was affected by drought, which in some instances resulted in the death of trees. More uneconomic coffee in poor condition has been uprooted and considerable areas of coffee have been replanted.

The African-grown Moshi coffee crop totalled 3,216 tons parchment, representing a yield of approximately 4 cwts. per acre. There is a slow but steady improvement in quality taking place, mainly through better methods of preparation and this would probably be accelerated if payment to African growers were to be made according to grade. Unfortunately this is difficult when dealing with thousands of small lots from individual growers.

The Moshi Native Coffee Board has concluded its fourth season's work and published a comprehensive report and balance sheet covering its operations for the year 1948/49. In addition to its routine functions of instruction in pest control and improved methods of preparation of the crop, the Board operated the new coffee school at Lyamungu and continued work at the three new coffee propagation centres on the mountain.

ESTATE COFFEE

The prolonged drought had an adverse affect on the trees on many estates. The general standard of cultivation on coffee estates has improved in recent years, though some notable exceptions exist which are a trial to officers of this department, a menace to neighbouring estates and as unprofitable to their owners as they are unsightly to passers by.

Before the war the production of estate coffee rarely fell below 3,000 tons per annum and invariably exceeded native production but in 1942 the position was reversed and has remained so ever since.

COFFEE PESTS AND DISEASES

Routine measures against pests were carried out and no serious outbreaks of pests were reported except coffee borer which, as might be expected in an exceptionally dry year, found conditions particularly suited to its development. There are signs that this pest is spreading steadily up Kilimanjaro and it has advanced up to the Coffee Research Station at Lyamungu.

ONIONS

Despite the usual difficulty of obtaining sufficient seed at the right time the Moshi crop was the largest since 1944. The crop grown under irrigation is less dependent on rainfall than on the attacks of thrips and the provision of good seed at the right time.

A few enterprising African growers sprayed their crop with D.D.T. with some success against thrips. In Mbulu District the season was a bad one and losses from thrips were severe.

Prices ranged from Shs. 17 per frasila (36 lb.) during the off-season (January to July) down to Shs. 6/- in the season (August and September) and rose again to Shs. 17/- as onions became scarcer towards the end of the year.

Export in tons for the past six years have been as follows :—

District	1944	1945	1946	1947	1948	1949
Pare	...	...	...	...	...	102
Moshi	1,156	875	740	991	830	1,154
Mbulu	764	1,325	943	967	1,255	1,037
	<u>1,920</u>	<u>2,200</u>	<u>1,683</u>	<u>1,958</u>	<u>2,085</u>	<u>2,293</u>

PADDY

The acreage of rain-grown paddy was up to average but the crop was a failure owing to the erratic rainfall experienced in the majority of areas. Considerable areas of swamp land, particularly around the base of the Usambara mountains could be utilized for rice production but the people prefer to remain in the over-populated and eroded mountains. A 30-acre pilot scheme for irrigated paddy-cultivation in the Luengera Valley was started during the year. Thirty cultivators undertook to grow an acre of paddy under supervision of an Agricultural Instructor. As the season advanced their initial diffidence has been replaced by satisfaction at the sight of what promises to be the best crop for many miles round. Good crops of paddy were also harvested under irrigation in the Pare District though the market sales were considerably lower than in 1948 owing to the failure of other food crops.

The figures of paddy production in tons, during the past eight years are as follows :—

Year	Pare	Korogwe and Handeni	Total
1942	2,120	580	2,700
1943	1,370	390	1,760
1944	745	135	880
1945	606	159	765
1946	24	23	47
1947	1,583	425	2,008
1948	1,200	817	2,017
1949	720	305	1,025

COTTON

Production of seed cotton, in tons, since 1944 has been as follows :—

<i>Tanga Province</i>	1944	1945	1946	1947	1948	1949
Pare District ...	335	52	96	150	98	58
Handeni District ...	35	24	81	61	244	192
Korogwe District ...	50	14	23	45	187	46
<i>Northern Province</i>						
Moshi District ...	95	107	154	186	74	210
Arusha District ...	33	13	9	3	3	17
Mbulu District ...	—	32	25	19	2	5
Total for Northern and Tanga Provinces	548	242	388	464	608	528

There was a considerable increase in the acreage under cotton in the Tanga Province but more than half of the crop in some areas was destroyed by drought and yields in the remaining areas were seriously reduced. Prices remained the same as for 1948, viz. 58½ cents per kilo for Grade "A" and 18 cents per kilo for Grade "C".

SUNFLOWER

This is the second year in which this crop has been encouraged amongst African growers and figures of production, in tons, were as follows :—

	1948	1949
Tanga Province	43	137
Northern Province	101	647
	144	784

The increase in production in 1949 affords no indication of the increased acreage that was planted as much of the crop suffered from drought. Also in some areas, such as the Usambara and Pare mountains, a large proportion of the crop is retained by growers for home consumption. The Agricultural Officer, Moshi, reports that the bulk of the African crop came from the Himo area and was solely due the improvement in the water furrow effected by the Agricultural Department in 1948. In Handeni District production increased from 31 tons in 1948 to 137 tons in 1949, which was very creditable in such a bad season.

SEED BEANS

Despite the dry weather, yields in general were satisfactory for, though the beans tended to be smaller than usual, the percentage of rejects was low.

The Seeds Board continued to control the industry during the year and the registration of growers and their sub-contractors was undertaken by the Agricultural Officer, Arusha, although the actual certificates of registration were issued by the Director of Agriculture. The Agricultural Officer, Arusha, eventually had to take over the duties of Executive Officer to the Seeds Board when the previous holder of the post resigned at the end of September. A number of meetings of Registered Seed Growers and sub-contractors were held during the year and it was evident that there was considerable divergence of opinion regarding the control of the industry between the longer-established growers and those who had more recently entered the seed growing industry.

Production figures for the past six years are as follows :—

				Tons
1944	...	...	...	343
1945	...	...	...	540
1946	...	...	...	534
1947	...	...	...	549
1948	...	...	...	1,655
1949	...	...	...	1,267

The export value of the crop was similar to that in 1948 but there are indications that both the demand and value of the seeds are on the decline as other producing areas are coming into production again. Growers who have already established a reputation for high quality and consistency in their products are likely to be able to maintain or even expand their business, but new-comers to the industry may find that they can only continue as sub-contractors since the very high standard of quality required is beyond the capacity of a number of growers.

COPRA

Nut yields were high during the first half of the year, as a result of good rains in 1948, but returned to normal during the latter part of the year. The production of copra during the year amounted to 5,147 tons, an increase of 1,990 tons over the previous year. This substantial increase was due to favourable weather conditions during the preceding year, a substantial increase in price, resulting in reduced smuggling to Kenya and Pemba, and improvements in plant sanitation. Unfortunately there has been little improvement in the quality of local-made copra though it is reported that traders are less ready to pay high prices for dirty badly-prepared copra.

Early in the year fair progress was achieved in the cleaning-up of coconut plantations but pressure in this direction had to be relaxed when the instructor staff had to concentrate on food production.

SISAL

Despite the unprecedented dry season the output of sisal on the Tanga line reached 66,000 tons, which is approximately 1,000 tons more than in 1948. This increase is partly due to new plantings coming into production but is also due to an influx of labourers in search of food. Towards the end of the year many of the fields showed the ill-effects of the prolonged drought and the output of fibre must have been affected to some extent.

MUHESA ORANGE INDUSTRY

The main crop amounted to 1,179 tons and was of average quality. The end-of-year "fly" crop was a failure owing to the drought and yielded only 25 tons of diminutive fruit. The total crop, therefore, amounted to only 1,204 tons, compared with 1,546 tons in 1948. There has been an increase in the demand for juice, mainly from firms in Kenya. Less of the main crop was exported as fresh fruit than was the case last year. After the demands for fresh fruit had been met, the balance of the crop was turned into juice. During the year the juice plant and buildings were renovated, several improvements being made and the number of reamers increased to twenty-four.

Approximately 500 budded orange seedlings obtained from the Sisal Experimental Station were distributed to growers near Muhesa and Pangani.

MUHESA CITRUS PLOT

This plot, which had been allowed to become derelict in recent years is to be resuscitated in 1950 with funds provided by the Native Treasury. It is hoped that this will become a means of training people in citrus propagation, maintenance and plant sanitation work.

ASSORTED FRUITS

Sales of fruit other than citrus amounted to 1,735 tons in the Tanga Province.

TEA

The Agricultural Officer, Lushoto, reports:—"Though the season was rather dry, even in the tea areas, the production of made tea exceeded 452,000 lb. This increase over yields in recent years may have been due, in part, to improved soil conservation practices on the only estate in production. A 5,000-acre block of Sakarre Estate, which previously grew a small acreage of tea, is being developed under the name of Dindirra Estate and extensive seed beds have been sown".

SUGAR

The total production of sugar during the year amounted to:—

			Toas
Refined sugar	...	...	7,429
Unrefined sugar	...	...	230
			7,659

VEGETABLES

Production in the Usambara mountains exceeded 475 tons, which, considering the weather, suggests a growing interest and range of vegetables. Seeds of a wide range of vegetables, to the value of over £200 were sold through the Agricultural Office, almost exclusively to African smallholders.

PAPAIN

Pawpaw production has practically ceased and the chief problem now is to persuade owners of derelict plantations to uproot and burn their derelict trees.

PASSION FRUIT

The plantation at Irente, near Lushoto, is now in production. The crop has not come up to expectations so far and considerable shrivelling of the fruit has occurred, possibly due to insufficient rainfall during the past months. Trial pressings of the fruit for juice have been made at the factory on the estate. Arrangements have also been made to promote the cultivation of this crop by Africans. Pamphlets and instructions have been issued to interested growers as the crop may possibly prove a useful source of revenue to the people of the Usambara mountains.

BETEL NUTS

This crop is grown in the Pangani river areas near the coast. Sales amounted to 66 tons compared with 68 tons in 1948 and 50 tons in 1947.

KAPOK

Accurate figures of production are not available as yet but it is estimated that the crop will amount to 60 tons, which is approximately 20 tons less than 1948.

ROOT CROPS

European potatoes were in short supply at various times during the year. The dry weather reduced yields per acre but also reduced losses from Irish blight, which however remains the most serious hindrance to production in the mountain areas of the provinces.

Sweet potatoes once again proved a valuable asset in a year of drought, particularly in areas where irrigation or a high water table was available.

Cassava reserves were seriously depleted in many areas as was only to be expected after the failure of the 1948 short rains. The erratic nature of the long rains resulted in a high mortality amongst newly-planted cuttings with the result that there is now a dearth of planting material in districts which a year ago had ample reserves of cassava. By the simple expedient of planting bundles of cassava branches in pits, it is possible to keep them alive for as long as twelve months, thereby ensuring that the grower has sufficient planting material in the event of successive losses from drought or other causes.

PYRETHRUM

The production of dried flowers declined slightly during the year but an upward tendency in prices has stimulated the replanting of old areas, and at the close of the year the acreage under this crop had substantially increased. The demand for East African flowers is still greater than the supply and it seems probable that the price will reach Shs. 1/9d. per pound for flowers with a pyrethrin content of 1.5, which is 6d. per pound more than the average price paid during 1949 for deliveries with a similar pyrethrin content.

The crop was again marketed through the agency of the Kenya Farmers' Association and from August onwards all flowers were delivered to the Association's godown in Arusha where samples were taken and dispatched to Nairobi for determination of their pyrethrin content. This resulted in a considerable saving in transport and handling charges and in prices being paid in relation to toxic content of the flowers.

The bulk of the best pyrethrum land at present in cultivation lies within the Meru Forest Reserve and protracted discussions have taken place in an endeavour to find a means of combining the growing of soft wood timber trees and pyrethrum.

Production figures for the past six years have been as follows :—

					Tons
1944	...	...	...	...	200.9
1945	...	...	...	...	306.2
1946	...	...	...	...	298.2
1947	...	...	...	...	204.3
1948	...	...	...	...	101.4
1949	...	...	...	...	91.2

CHAGGA RESETTLEMENT

A team of officers from the Provincial Administration, Agricultural and Water Development departments was seconded during the year in order to implement the provisions of the Wilson Report. Plans have been drawn up and submitted to Government and it is hoped that a start will be possible early in 1950.

DEVELOPMENT PROJECTS

GOMBERO COCONUT SCHEME

The Senior Agricultural Assistant, Tanga, reports:—"An early start was made in the building of the first kiln but it was only after some difficulties with inefficient workers and the shortage of water that work on this kiln was eventually completed some weeks later than was at first expected. Owing to the drying up of the local water supply, which was a serious handicap, with the nearest water supply four miles away and no transport available, the building of the second kiln and store was abandoned until after the long rains. Unfortunately the long rains failed but building was recommenced in August when a Government lorry was available. Owing to the expenses of carting water, brick-making was abandoned and all building was done in stone.

Further difficulties then arose. Competent masons were scarce and when found had to be provided with food from Tanga and drinking water from a point eight miles away. After many difficulties all building work was completed late in December. The buildings comprise a battery of two double kilns, with a daily output of 6,000 nuts, a copra store, a house complete with kitchen, and boys' quarters.

MLALO REHABILITATION SCHEME

The agricultural and medical survey of the Mlalo Basin was completed during the year and a full report submitted to Government. The implementation of the findings of this very full report is fraught with difficulties, which are mainly of an administrative nature. Whether or not the people can be persuaded to undertake the drastic reforms necessary for their own well-being remains to be seen; but in any case it is essential that the goodwill of the chief and the great bulk of the people be obtained before any drastic reforms are introduced.

IMPROVEMENTS OF FURROWS IN MOSHI LOWLANDS

Under the direction of the Agricultural Assistant very satisfactory progress was made with the construction of a number of furrows during the latter half of the year. Much of the masonry work was done by the Agricultural Assistant himself, thereby effecting considerable savings which were utilized for buying cement. Three furrows started in 1948 were completed and eleven new furrows were constructed.

SOIL CONSERVATION ON EASTERN KILIMANJARO

During the latter half of the year additional soil conservation instructor staff were posted to the Rombo area to construct new contour banks and maintain the existing banks. The strip-cropping demonstration had to be suspended temporarily owing to the continued dry weather and the shortage of staff. Lack of staff has also precluded the carrying out of an agricultural survey of Eastern Kilimanjaro without which it is impossible to complete a plan for this area.

SOIL CONSERVATION

It is becoming increasingly apparent that contour hedging is a spectacular but ineffective means of preventing soil erosion, for the African objects to planting dense-growing effective hedges such as elephant grass, owing to the resultant competition with his crops, and such hedge plants as he will consent to employ are planted too thinly to be of any value in preventing surface wash. Contour re-ridging is unpopular since it entails extra labour. The construction of bench terraces and contour banks by hand labour or mechanical means appears to offer the only permanent means of preventing surface wash. Six excellent demonstrations of both bench-terracing and narrow-base contour banking were carried out in Arusha District by Officers of the Soil Conservation Service with the assistance of funds provided by the Native Authority. These demonstrations near Arusha though excellent in themselves serve to impress upon one the vast amount of conservation work that will have to be undertaken in the near future if these valuable lands are to be saved from destruction. A very large amount of machinery and man-power will have to be employed over a period of years before the problem can be regarded with any degree of equanimity.

Broad-base terracing of lands on several European estates was undertaken by the Soil Conservation Service when the necessary machinery had arrived.

There was a progressive deterioration in the grazing areas near Arusha as the dry season advanced and an increasing number of herds concentrated round the few permanent watering points. Provision of dams throughout Masailand is an essential step in the preservation of the grazing in the plains adjoining the above-mentioned mountains. The construction of the requisite number of dams will, however, entail the provision of far more excavating machinery than is at present available for the purpose.

BOZA COCONUT PLOT

The young palms continue to make good progress. A heavy infestation of Rhinoceros beetle at the beginning of the year resulted in thirty-nine casualties. The cause of this sudden infestation was found to be a rotting baobab tree from which over 500 beetles, pupæ and larvæ were removed. Thereafter there was a considerable reduction in the numbers of beetles and larvæ removed from young palms. Nuts from suitable mother-palms to replace the palms lost have been planted in a nursery for filling in the gaps in the plot during the coming long rains.

VERMIN

Vermine and game continued to take their toll of crops. In Arusha District a successful campaign against pigs, baboons and monkeys was waged by the instructor staff using arsenical baits. Over 600 corpses were buried and it is probable that many more remained undiscovered. Fland and other game did considerable damage to wheat and maize in the areas adjoining Masailand. Bird damage to wheat was not as serious as in past years but the losses sustained were far from negligible.

WEEDS

The fouling of good agricultural land with weeds was again evident and in several instances fields of wheat had to be abandoned owing to excessive weed growth. There is little doubt that many farmers are not fully alive to the

reduction in crop yields that they suffer as a result of competition from weeds, particularly during the dry weather when their crops require all the available moisture in the soil.

LOLJORO SETTLEMENT

This area was previously cultivated on short-term war-time leases for food production. During this year, with the help of the Survey Department, the whole area was divided up into twenty-two farms, ranging from 1,500 to 2,000 acres in extent. Sixteen of these farms have been allocated by the Land Settlement Board. The remaining farms are more suitable to ranching than arable farming and their development must await the development of water supplies.

CONCLUSION

The year generally speaking was a difficult one for cultivation, particularly in the Tanga Province. The Northern Province provided a surplus of grain whilst the Tanga Province, with its very large sisal industry, once again became a heavy importer of food for labourers. The sisal estates made every effort to grow their own requirements of food but they were defeated by the drought. The papain industry continued to decline but sisal, coffee and pyrethrum are booming and the seeds industry is progressing satisfactorily.

The livestock industry of the Northern Province is of immense value to the Territory but it is pathetic to see so many famished cattle wandering over the dusty plains during the latter part of the dry season, the inevitable result of herdsmen who are content with a nomadic existence and prefer quantity to quality in their herds and have little use for a cash economy.

In the mountain blocks of both provinces there are tribes who are faced with land hunger and a rapidly increasing population. Accustomed to dwell in their cool, healthy mountains they are naturally averse to settling in the hot and malarial plains. Yet their future well-being inevitably lies in the plains unless their birth rate declines very materially, which it shows no signs of doing. It is clear, therefore, that future development of such areas lies in the opening up of the plains with every means at our disposal, so that the young men from the mountains can be encouraged to earn a satisfactory income from agriculture in the plains and thereby increase the production of much-needed food crops for the Territory's industrial needs.

A. H. SAVILE,
*Provincial Agricultural Officer,
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SOUTHERN PROVINCE

CLIMATIC CONDITIONS

In general it may be said that the Province was lucky in comparison with the remainder of the Territory. Rainfall was below average and patchy in incidence and in some areas there were losses of standing crops. A good average harvest of staple African food-crops was achieved, however, as in most areas the rainfall distribution was just sufficient to bring the crops to maturity. Water levels in streams fell much earlier than usual and owing to the late commencement of the rains water levels were very low everywhere.

The rains began in late December, about a month late and some anxiety was felt on this account. A satisfactory spell of rain enabled some plantings to be done and this was followed by another dry spell. It is hoped, however, that more rain will fall at frequent intervals to enable the new season's plantings to be satisfactorily established.

FOOD CROPS AND FOOD SUPPLIES

Ample food was produced in the Province for the local population and a quantity, estimated as being sufficient for fulfilling the requirements of employers of labour, has been bought by the Grain Storage Department. Lack of storage space still presents a problem. There is still quite inadequate accommodation for storing produce both for the purpose of keeping grain dry and to keep it free from weevil so that supplies will last over until the next harvest. Tarpaulins are being used as a temporary expedient but this method is not satisfactory and it is sincerely hoped that adequate facilities will be installed before the next harvest. A campaign was instituted in all districts to increase production in the coming season and the fullest support for this has been given by the Provincial Commissioner and the District Commissioners. Acting in close collaboration with the District Commissioners and the Native Authorities are the officers of this Department and their African staff. It is fully realized that the foundation on which the development of this Province stands is the provision of ample food for all and no effort is being spared to achieve this end. Plans for increasing the scope of production by mechanical means are dealt with in a later paragraph. Appendices relevant to Food Crops and Food Supplies are attached hereto as follows :—

Appendices :—

A.—Produce market intake figures.

B.—Produce purchased by the Grain Storage Department.

C.—Export Figures.

Notes on crops follow in the next paragraph but for tabulated figures the above appendices should be referred to.

CROP PRODUCTION

(a) *Sorghum*.—What would have been a very good crop was reduced by poor rainfall in some areas, nevertheless some 4,042 tons have been purchased by the Grain Storage Department. There has been a tendency on the part of growers to over-sell their grain (both maize and sorghum) which fact combined with the late commencement of the rains has caused many very rightly to restrict the sale of cassava.

(b) *Maize*.—The amount of maize purchased exceeded estimates: the good keeping qualities of hard sorghum as compared with short-term maize are fully realized by Africans and hence they sell off maize to a greater extent. 3,569 tons were purchased by the Grain Storage Department.

(c) *Paddy and Rice*.—The rice crop was only fair, mainly due to heavy losses of hill rice in those areas which received inadequate rainfall. Comparatively little of the crop came under control: 422 tons. There is a most marked difference between the quality of Tunduru hand-hulled rice and that produced in coastal areas. Whereas the former is clean and well winnowed the latter contains a high percentage of mixed and broken grains and

extraneous matter. So evident was this that a higher price was recommended for Tunduru rice. It is hoped to develop rice production by mechanical ploughing in suitable valleys, notably the Ruvuma, the Lukuledi, Matandu and Mbwemkuru river valleys.

(d) *Cassava*.—This constitutes the Provincial famine reserve and in the case of 1949 when Tanganyika was faced with food shortage in many Provinces, all available surplus was intended for export to assist in alleviating these shortages. For various reasons, some of which have been referred to in an earlier paragraph the quantity obtained so far has been far short of hopes and expectations. Plantings are being pressed hard for the new season and there would seem to be a good market in the United Kingdom for cassava as stock feed if it is not required for local or Territorial use. In 1949 the amount exported and available for export amounted to 8,122 tons.

(e) *Sesame*.—This has been a moderate year for sesame and considerable damage by flea-beetle was reported earlier. Up to the end of the year some 1,196 tons had been exported as compared with 3,209 in 1948. 237 tons were milled locally.

(f) *Groundnuts*.—Exports were small this year, amounting to 168 tons only as compared with 454 tons in 1948. Grown primarily for home consumption, it is believed that increased local sales to employees of labour account for the export figures falling from an average of some 1,600 tons from 1938 to 1945 to a few hundred tons annually since that year.

(g) *Cashew Nuts*.—This crop again proved very popular and an increase in price caused considerable activity in shipping towards the end of the year. The rainfall was a little low and the crop somewhat smaller than hoped for, 3,276 tons being exported as compared with 4,533 tons in 1948.

The price of cashew nuts varies from Shs. 300/- to Shs. 450/- per ton. This year the price opened at Shs. 300/- per ton and worked up to Shs. 450/- per ton for consignments towards the end of the year.

(h) *Pulses*.—A very small quantity was exported, fifty-three tons as compared with 662 tons in 1948. Mainly required for home consumption and local sales, it is believed that supplies are ample for this purpose. Control was imposed late in the year and 104 tons were purchased by the Grain Storage Department. Cowpea and bambarra nuts are grown extensively in Newala district and cowpea and pigeon pea are grown in all districts.

(i) *Sisal and Tour*.—Export declined somewhat as compared with 1948 when 12,116 tons were exported. In 1949 the total export amounted to 11,389 tons. There is a possibility of new land being made available as the result of the opening of the Southern Province Railways. One large estate has a very large proportion of immature sisal, some fifty per cent, and another estate also has a high percentage. Uprooting and replanting has been observed on other estates and these facts indicate that production should increase within the next few years.

(j) *Coconuts and Copra*.—Exports of copra were the largest recorded, being 1,379 tons as compared with 888 tons in 1948, which in turn was the highest recorded up to that date. 372 tons were milled locally. It is intended to press as hard as possible the rules for coconut sanitation and to continue to increase production. Four plantations have been recorded for the past few years and an analysis of these records is given at Appendix D.

In this connection, it should be noted that the Mikindani shamba is on the coast whereas the three Ngapa shambas are some twenty miles inland. The average yield is notably higher on the coast as is the highest yield. There are indications of high-yielding trees. Selections Nos. 110 and 147 at Mikindani both of which recorded the highest yield in two years out of the six years recorded. Selection No. 184, Ngapa, appears to be a consistent yielder and no doubt closer study of the detailed records will reveal a fair proportion of consistently good yielders.

(k) *Tobacco*.—A record crop of 888 tons of leaf was purchased in 1949 as compared with 594 in 1948. The highest hitherto recorded was 630 tons in 1943. After a doubtful start on account of erratic rainfall the crop ultimately did well; indeed the factory was strained beyond its efficient capacity. According to latest records as at the end of November, 4,331 bales, approximately 433 tons, have been processed and baled and have been shipped or are waiting to be shipped. There is a carry-over of 157 tons of leaf to be processed and baled. The final out-turn cannot therefore be given in this report.

The erection of a new factory or increased facilities at the old in time to deal with the crop is a matter of urgency. Another difficulty is transportation. Up to the present there has been a limit to the amount which could be evacuated from Mbamba Bay and it was found necessary to evacuate some consignments through Lindi. This latter route has certain disadvantages. The problem of the evacuation of valuable and vulnerable produce is not fully resolved. Rules were drafted for tobacco growers and brought before the Board at a meeting held on 15th December. Meetings of the Board were held on 20th April, 22nd June, 1st October and 15th December.

A schedule of comparative prices for local sales is given below for 1948 and 1949 showing the substantial rise in price for these sales :

Grade	Price per kilo, Lindi			
	1948		1949	
	Shs.	Cts.	Shs.	Cts.
3 leaf	1	65	2	15
3 NP	1	45	1	90
3 Fupi	1	20	1	60
4 leaf	1	15	1	50
s leaf	—	—	1	25
Good scraps	0	65	1	00
Green	1	50	1	85

The Board resolved that all fully-prepared tobacco for export should continue to be sold through one agency.

Investigations began in regard to the possible introduction of a flue-cured tobacco industry by non-natives in Songea and Tunduru.

There was also a small export of coil tobacco; unfortunately, in export returns from Customs, only one return has been made in respect of both fire-cured (from Songea), and coil tobacco from various districts. It is believed that from the amount shown as exported some twenty-four tons only were coil tobacco.

(l) *Coffee*.—The coffee grown in the Matengo division of the Songea district was handled by the Ngoni-Matengo Co-operative Marketing Union. Fifty-five tons were transported to Lindi for shipment as compared with fifty-two and a half tons in 1948 and thirty-one and a half tons in 1947. This coffee is being auctioned in Mombasa.

The fostering of this small industry requires the attention of an Agricultural Officer or Assistant with experience of coffee to produce the best results; no such officer has been available for some time.

(m) *Wheat*.—This is grown only in Songea district and in 1949 425 tons were purchased as compared with 420 tons in 1948. Some effort is being made to increase the production to make the Province self-sufficient for this product. The target is 750 tons grain which, after the installation of additional machinery should provide for the maximum output of 600 tons flour. Surplus grain would, presumably, be sold to Iringa. The main difficulty in encouraging production is the comparatively high prices received for tobacco and sunflower seed.

(n) *Potatoes*.—European potatoes are grown in Songea and Tunduru and the latter exports some hundreds of tons to the eastern districts of the Province. As these are not under control and are all purchased within the Province the exact figures are not known but are probably in the region of 400 tons. A trial on the Rondo Plateau was unsuccessful.

(o) *Cotton*.—The cotton season was rather better than in 1948, the following being the amounts of seed-cotton purchased :—

District	A Kilos			C Kilos			Total
Tunduru	...	...	123,917	...	—	...	123,917
Mtua	...	...	18,800	...	—	...	18,800
Mikindani	...	...	33,562	...	2,528	...	36,090
Total 1949	...	...	176,279	...	2,528	...	178,807
Total 1948	...	...	79,788	...	3,543	...	83,331

Production of lint was :

Ginnery	AR lb.			BR lb.			Total lb.
Tunduru	...	...	85,600	...	—	...	85,600
Mtua	...	...	12,000	...	—	...	12,000
Mikindani	...	...	23,408	...	1,716	...	25,124
Total 1949	...	...	121,008	...	1,716	...	122,724
Total 1948	...	...	56,960	...	2,388	...	59,348

(p) *Sunflower*.—The production of this increased in popularity and there was an export of 578 tons during the year. There is no record of previous export, in fact only a little over 100 tons passed through markets last year which was used locally or for seed. It is understood that in 1950 there will be no guaranteed price and this no doubt will cause the price to find its own level in competitive trade and ultimately the production may decline. This should be of no great importance, however, from the point of view of the export of this product as it is understood that the Overseas Food Corporation are including sunflower in their planting programme.

(q) *Millet*s.—These did quite well, although not produced on a large scale anywhere except in Newala district. Not popular as food, but used mainly for beer-brewing, millet not so used is sold and 339 tons were purchased by the Grain Storage Department.

(r) *Beeswax*.—174 tons were exported as compared with 164 tons in 1948.

(s) *Gum Copal*.—Twenty-eight tons were exported as compared with sixty-five and a half tons in 1948.

(t) *Mangrove Bark*.—1,296 tons were exported as compared with 1,783 tons in 1948. Mangrove cutting was, however, closed for a large part of the year as there was evidence of over-cutting.

(u) *Colombo Root*.—There is evidence of increasing interest in this product and 227 tons were exported as compared with twenty-five tons in 1948. Colombo root is not cultivated but collected from indigenous growth, mainly in moist valleys. Live planting material was sent to the Senior Botanist, Uganda for propagation purposes. Colombo root is a speculative product in which to deal as the price fluctuates violently during the season between Shs. 8/- and Shs. 19/- per frasila. It is possible that the evidence of increasing interest in the product, mainly in America it is believed, will tend to stabilize the price at a reasonably high level for some time.

(v) *Native Starch*.—Production of this has declined in recent years, whereas from 100 to 300 tons were exported between 1944 and 1947 only nineteen tons were exported in 1948 and fourteen in 1949.

(w) *Castor Seed*.—Nineteen tons were exported in 1948 as compared with thirty-one and a half tons in 1949.

EXPORTS

A table of exports in 1949 is given at Appendix D with values and the exports figures as from 1944 for comparison.

MARKETS AND MARKETING

Marketing arrangements were good in 1949 and most District Commissioners have installed new markets in areas where it was found that there was difficulty in disposing of produce. This is an important matter to obtain the maximum amount of produce, and all Departmental Officers on safari keep an eye on this aspect in order to advise the District Commissioner where additional markets may be needed.

The channel through which produce passes is :

- (a) from grower to market,
- (b) purchase by small local traders or agents for the larger township traders,
- (c) sale in the case of controlled produce, to the Grain Storage Department or export in the case of other produce.

SOIL CONSERVATION

With a small increase in staff in some districts it has been possible to tackle the task of pressing tie-ridging. In the Songea District the sapient practice of the Matengo pit system continues and the District Commissioner and departmental officer are pressing this system to completion in all applicable areas. In others a strong drive has been made to introduce tie-ridging on a

large scale. Cultivations can often be seen on steep slopes and the correction of this will, it is hoped, be achieved. This and other matters connected with soil conservation are included in the draft set of Native Authorities rules prepared by the Provincial Agricultural Officer for adoption throughout the Province.

GAME AND VERMIN

The loss of foodstuffs annually in the Province must be very high and although the difficulties of dealing with wild pig and baboon and other vermin are fully realized it is considered that the attitude of both Native Authorities and peasants is supine and a memorandum for the Provincial Commissioner and all District Commissioners was prepared and discussed for the purpose of stimulating interest. It was accepted and there is evidence of increasingly active measures being taken to combat vermin.

The control of rats where necessary was successfully accomplished by means of Barium Carbonate bait and similar measures are being taken in the present planting season. Damage is caused annually by giant snails (*Achatina fulica*) which occur when young crops are beginning to bear. Although a comparative minor menace it has achieved some notoriety during the year and a question was asked in the House of Commons about its activities. The elegant Grasshopper (*Zonoceros elegans*) also occurs annually at the time of planting at the end of the calendar year and causes damage to young growth. It is believed that control could be achieved of both if children could be induced to collect by hand and destroy, as neither is a very fast mover. These, however, may be regarded as minor vermin as compared with rats, pig, baboon, monkeys, hippos and elephant.

MAHIWA RICE STATION

(a) *Weather*.—The rainfall was exceptionally low only 18.51 inches being recorded on eighty-four days. It had been noted during the year that whereas heavy showers fell all around, the Mahiwa area received very little.

(b) *Rice*.—The experiments for the year were of little value mainly on account of the very poor rains coupled with labour difficulties at planting time. Details of yields were submitted with the September report to the Development Commission and there are no results of significant value.

(c) *Various Crops*.—Trials of maize varieties were continued and also sorghum, both suffering from drought. A trial of cassava on ridges versus flat indicates to the eye that it is better on the ridges. Weights will be recorded later when lifted, for comparison. Cowpea, sweet potatoes, and maize were planted in the rice dams during the dry season, with poor results owing to drought.

(d) *Oil Palms*.—An area has been cleared for the planting of oil palms which will be carried out during the new season.

(e) *Vegetables*.—Vegetables were grown and sold and it is hoped to extend this as far as possible.

(f) *Orchard*.—A moderate crop of citrus only was harvested; some 1,800 seedlings in pots were sold early in the year and some 2,000 will be available early in 1950.

(g) *Cattle*.—The herd has done well during the year. Two cows in April gave positive reaction to Trypanosomiasis test, but recovered completely under treatment with Dimidium Bromide. After a poor rainy season and a prolonged dry season pasture was very poor; the good condition of the herd is attributable to supplementary feed of oil-cake and elephant grass cut in the valley bottom.

(h) *Poultry*.—Two pens of Rhode Island Reds were established in middle April but the birds are not thriving. 544 eggs were laid by the fourteen pullets between middle April and the end of the year of which 212 were sold for setting.

(i) *Pasture*.—On receipt of funds, a start was made on clearing regeneration of previous clearings and on extending the clearings to improve pasture. This work was retarded owing to lack of labour, such labour as there was having to be engaged on preparation of rice dams. It is intended to construct paddocks with sisal fences.

(j) *Buildings*.—A new cow-byre was practically completed at the end of the year. This is intended for cows in milk and contains sixteen stalls and is fitted with feeding troughs and dung and urine drainage channel.

(k) *General*.—Mahiwa has made some progress during the year and it is hoped to make further progress in 1950 if funds are available. Increased estimates for 1950 both for Capital and Recurrent Expenditure were submitted. Estimates for the reconstruction of the dam, on which the working of the farm to capacity depends, are awaited from the Water Development Department.

OVERSEAS FOOD CORPORATION

The Provincial Agricultural Officer visited the Nachingwea area under development by the Corporation several times to maintain liaison with them. Of particular interest is the Experimental Farm where various trials are carried out. At the end of August the Provincial Agricultural Officer was nominated as Chairman of the Liaison Committee and a successful first meeting was held on 11th October, 1949. A second meeting convened for 14th December, 1949, had to be postponed at short notice, owing to the sudden arrival of the Minister for Food and the consequent inability of some senior members to attend.

DEVELOPMENT SCHEMES

The Southern Province, formerly referred to as the "Cinderella" Province, is showing signs of considerable progress. The activities of the Overseas Food Corporation with the many contracting firms working for them are well-known and although their original plans have been modified, it may confidently be expected that there will be large development. In September the Southern Province Railway from Mkwaya to Nachingwea was opened and work continues on the Ruvo to Mtwara section. The oil-pipeline from Mtwara to Noli was also completed.

The Colonial Development Corporation are also interested in the Province and various projects were put before them. The development of a non-native flue-cured tobacco industry is under investigation for Songea and later, perhaps Tunduru.

Fish Ponds.—Some fish ponds were started near Mikindani and two trial ponds were made in the Lukuledi estuary. It is hoped that this valuable enterprise will develop rapidly.

Mechanical Cultivation.—Some trial areas amounting in all to 200 acres were ploughed in the Matandu river valley by units of the Rufiji ploughing scheme. It is hoped that a successful year will encourage growers to adopt this method of increased production and that ploughing units will be purchased by the Native Treasury in time for next season's plantings.

PESTS AND DISEASES

The flea-beetle caused considerable loss of sesame but apart from this the year has been reasonably free from any major attack of either pest or disease. An Instructor was sent to the Rufiji area to assist in a search for Red Boll-worm. It is believed that little or none was found.

SUMMARY

It may be said that the Province has had a fairly successful year and there are signs of great progress. The rainfall was below average, seriously so in some areas, but generally speaking the distribution was good and this enabled the annual crops to reach maturity, and this is responsible for the fact that the Province is self-supporting for food, with an exportable surplus of cassava.

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APPENDICES :

- A.—Market Returns.
- B.—Controlled Produce Purchased.
- C.—Export Figures.
- D.—Coconut Records.

SOUTHERN PROVINCE
PROVINCIAL PRODUCE MARKET RETURNS

District	Mtama 1949	Maize 1949	Pulses 1949	Rice and Paddy 1949	Cassava 1949	Groundnut 1949	Sesame 1949	Millet 1949	Cashew Nuts 1949	Beeswax 1949	Colombo Root (Kauma) 1949	Castor Seed 1949
Lindi ...	2,353	732	—	—	—	13	454	15	828 $\frac{3}{4}$	2 $\frac{1}{2}$	86	35 $\frac{1}{2}$
Newala ...	2,394	1,344 $\frac{1}{2}$	1,457	101	358	156	138	518	675 $\frac{3}{4}$	4	—	—
Masasi ...	218	509	530	102	4,110 $\frac{3}{4}$	550	273	95	308	—	—	1 $\frac{1}{2}$
Tunduru ...	10	438	529	56	673	215	111	19	—	—	—	16 $\frac{1}{2}$
Mikindani ...	387	251	172	301	—	—	91	8	260	—	—	—
Kilwa ...	1,071 $\frac{1}{2}$	97	209	41	690 $\frac{1}{2}$	—	449	1 $\frac{1}{2}$	—	1 $\frac{1}{2}$	—	—
Songea ...	—	67	177	587	2	14 $\frac{1}{2}$	101	—	—	24 $\frac{1}{2}$	—	—
*Ruponda ...	147 $\frac{3}{4}$	2	23 $\frac{3}{4}$	2	1 $\frac{1}{2}$	19	93 $\frac{1}{2}$	—	1 $\frac{1}{2}$	—	—	—
Total tons ...	6,581 $\frac{1}{4}$	3,440 $\frac{1}{2}$	3,097 $\frac{3}{4}$	1,190	5,835 $\frac{3}{4}$	967 $\frac{1}{2}$	1,710 $\frac{3}{4}$	655 $\frac{1}{2}$	2,074 $\frac{1}{4}$	31 $\frac{1}{2}$	86	54
Export tons ...	250	66	53	—	5,861	168	1,196	220	3,276	174	227	62

*New district.

PRODUCE PURCHASED BY GRAIN STORAGE DEPARTMENT

(Including produce bought by estates on permit) 1949

Product	Tons
Maize	3,569
Cassava	3,076
Pulses	104
Rice	422
Sesame	33
Millet	339
Wheat	425
Edible Oils	12
Sorghums	4,042
Groundnuts	21

SOUTHERN PROVINCE
EXPORTS FROM LINDI, MIKINDANI AND KILWA
(IN TONS)

Product	1944	1945	1946	1947	1948	1949
Groundnuts	954.39	1,755.98	373.00	991.11	454.27	168.22
Sesame	2,653.82	3,223.96	2,976.70	3,344.23	3,209.01	1,196.24
Mtama	2,002.91	2,056.00	117.75	4,253.91	1,377.94	249.64
Maize	1,504.60	48.40	10.10	1,932.39	306.81	66.20
Pulses	338.56	857.68	53.15	4,976.19	662.35	52.68
Cashew Nuts	354.55	3,971.97	1,900.43	1,312.72	4,533.30	3,275.54
Beeswax	112.57	44.61	331.15	51.54	163.96	174.04
Tobacco	117.84	129.53	185.81	126.50	156.72	194.03
Cassava	7,957.02	261.80	1,870.92	2,244.06	14,051.68	5,860.63
Wild Rubber	64.39	118.55	45.81	—	—	—
Gum	162.94	112.96	196.52	61.77	65.54	27.81
Mangrove Bark	1,575.00	3,455.25	1,238.93	3,548.00	1,783.16	1,296.00
Colombo Root	192.20	346.80	85.19	96.99	25.39	226.63
Native Starch	253.25	108.42	100.70	12.67	18.94	13.90
Copra	809.06	699.47	635.05	625.51	888.12	1,379.31
Other Grain	84.29	369.90	41.60	13.50	10.25	—
Millet	—	—	122.05	769.71	119.35	220.08
Rice	—	—	—	536.95	47.03	—
Sisal and Tow	13,165.00	11,139.00	9,817.00	9,074.00	12,116.00	11,389.00
Castor Seeds	—	—	—	—	19.05	61.45
Cotton (Lint)	132.00	128.00	48.00	31.00	26.42	54.78
Sunflower	—	—	—	—	—	578.29

COCONUT COUNTS

SHAMBA MIKINDANI

Details	1944	1945	1946	1947	1948	1949
Total nuts	31,845	32,007	27,661	53,233	38,627	30,819
No. of trees	316	315	314	322	318	317
Highest yield	249	364	203	227	241	275
Lowest yield	33	23	16	41	51	25
Average over all	100	101	88	165	121	97
Selection number of highest yielder ...	147	110	113	11	110	147

SHAMBA NGAPA—YUNUS ALI

Total nuts	—	—	—	8,973	15,426	16,333
No. of trees	—	—	—	200	200	200
Highest yield	—	—	—	96	148	146
Lowest yield	—	—	—	10	28	11
Average over all	—	—	—	44	77	82
Selection number of highest yielder ...	—	—	—	190	184	184

SHAMBA NGAPA—YUSUF SELEMANI

Total nuts	—	—	—	3,776	9,259	7,191
No. of trees	—	—	—	100	100	100
Highest yield	—	—	—	90	146	124
Lowest yield	—	—	—	11	31	12
Average over all	—	—	—	37	92	72
Selection number of highest yielder ...	—	—	—	313	303	358

SHAMBA NGAPA—BINTI NASORO

Total nuts	—	—	—	4,003	4,354	3,743
No. of trees	—	—	—	100	100	97
Highest yield	—	—	—	82	103	90
Lowest yield	—	—	—	9	6	1
Average over all	—	—	—	40	43	39
Selection number of highest yield ...	—	—	—	488	456	446

ANNUAL REPORT, 1949

PLANT PATHOLOGY

Plant diseases.—The more important diseases observed during the year are listed below; those newly recorded are being dealt with more fully in a Mycological Circular.

Passion-fruit vines.—Observations at the end of the year showed the 'Woodiness' virus disease to be established in old vines at Lushoto and near Moshi. So far the symptoms of the virus strain are more obvious in the fruit than in the leaves.

Pyrethrum.—The disease 'Bud Rot' caused by the fungus *Ramularia bellunensis* has been identified in plants from the Southern Highlands Province. Trials are planned which it is hoped will indicate control measures.

Sorghum.—Seed treatment trials for smut control were established in three provinces in collaboration with the Provincial Agricultural Officers, but all the results are not yet to hand.

Papaw.—In view of the possible revival of the papain industry, a study was made of diseases in old fields. A warning was given to growers regarding the danger of these to new plantings.

Kapok.—The very common die-back of branches and tops of kapok trees was investigated by the Entomologist and Plant Pathologist in the Korogwe and Tanga Districts. No insect or fungus parasite is suspected. The disease is common in 'Java' kapok except where this variety has particularly favourable growing conditions—deep, light soil and freedom from competition with weeds. The 'Giant' or Togo Edelkapok appeared to flourish wherever grown.

Forest plantations.—Soft wood trees are being severely attacked in some areas by *Armillaria* root rot. The disease there is being studied in collaboration with members of the Forest Department. New hosts for *Armillaria mellea* observed during the year are: young *Ocotea usambarensis*, *Pinus patula*, *Casuarina* sp., Wattle (*Acalia Melanoxylon*) and Camphor (*Cinnamomum camphora*).

Cypress.—No further cases of Canker (*Monochaetia unicornis*) have been seen.

Geranium.—Plants of ornamental species were affected by the virus disease 'Pelargonium Leaf-Curl' a misleading name as curling of leaves is unusual and was not seen in the affected plants. Plants of the affected varieties were destroyed, and no further cases had been seen a year later.

Zinnia.—A bacterial spotting of leaves and petals, apparently not recorded in East Africa, was seen in plants near Moshi. The disease had previously been recorded in Southern Rhodesia and the organism is named *Xanthomonas nigromaculans* Takimoto f. sp. *zinniae* by Hopkins and Dowson.

Aloe.—Rust, *Uromyces aloes*, has been seen in plants growing under conditions which favour it, i.e. overcrowding, with excessive moisture and shade.

GEO. B. WALLACE,
Plant Pathologist

ANNUAL REPORT OF THE ENTOMOLOGIST, LYAMUNGU, FOR 1949

Locusts.—No reports of locusts have been received during the year.

Sisal Weevil.—*Scyphophorus acupunctatus*, Gyll, Releases of three predators of the Banana weevil, *Cosmopolites sordidus*, Oerm. received from Trinidad by courtesy of Dr. Simmonds, continued. Three species of predators were received, *Dactylosternum* sp. ? *hydrophiloides* Mc. L. or *abdominale* L.) *Plasius javanus*, and *Leionota quadridentata* Oliv. Both *Plasius* and *Leionota* have been recovered from the field some months after the last release, but there is as yet no evidence that breeding has taken place. Owing to the longevity of the adults, at least a year must pass from the last releases before adults found in the field can be assumed to belong to a generation bred here. Four beetles (Carabida) identified as *Morion georgiae* Pal; obtained by Mr. Scaramuzzo from Yucatan were left to breed, but were not again found. A single specimen, identified as *Hololepta yucateca* Mars was also received from Mr. Scaramuzzo.

In November arrangements were made with the Senior Research Officer Ngomeni, to test certain systemic insecticides against Sisal weevil, particularly Pesto 111 and Fosfern. Artificial infestation of the sisal plants with larvae proved difficult, owing to their being attacked by ants, and the experiments were not completed until January, when it was found that whilst results with Pesto 111 proved disappointing, those with Fosfern were promising.

Coffee

Antestia.—A comparison of the three methods of Antestia control, arsenite baiting, pyrethrum dusting, and D.D.T. spraying over several years was undertaken from the records of the Coffee Research Station. These showed clearly the superiority of the D.D.T. spray. An article on the subject was published in the East African Agricultural Journal, July, 1949.

D.D.T. spraying on a large scale was undertaken at Bugufi, but the results are not yet to hand. The K.N.C.U. decided to abandon arsenite spraying for D.D.T. spraying at the end of this year.

Thrips.—The D.D.T. spray against Antestia also proved effective against thrips, during an outbreak on the Coffee Research Station this year. Unfortunately this occurred during the absence of the Entomologist, and no figures are therefore available to support this observation.

White Borer Anthores leuconotus Pasc.—Experiments laid down to test the effect of spraying and stem painting with Paris Green and D.D.T. showed that whilst D.D.T. gave disappointing results, some control was obtained with Paris Green, both by spraying and by stem painting. The object of the test was to see if spraying the trees before the rains, that is before the emergence period of the adult beetle, could reduce the adult population sufficiently to give reasonable control. The treatments were applied before the short rains; further experiments are to be laid down before the long rains.

Sugar Cane.—A further importation of *Bufo marinus* was made from Trinidad and the toads released at the Tanganyika Planting Company, Arusha Chini, in March, 1949. These were released, since previous attempts to breed them in artificial pools had failed. No further signs of them have been seen since.

Soil treatment with Agrocide 7 at the time of planting the setts appears to have given almost complete control of white grubs.

Other pests.—A serious outbreak of scale on cassava, identified as *Aonidiomytilus albus*, was reported from Ukerewe Island in January, and later from the mainland in the Lake Province. Army worm was reported very generally in January in the Northern Province and did considerable damage. A weevil, identified by the Commonwealth Institute of Entomology as *Nomatocerus castaneipennis* Hust was reported defoliating young plantations of *Eucalyptus citriodora* in Mwanza district. The presence of Lepidopterous larvæ in tea seed exported from Tanganyika to Kenya caused some alarm, and regulations to ensure the cleanliness of such seed have been devised.

Arrangements to import *Hyperaspia jocosus*, a Coccinellid imported into Kenya against the Lantana Bug, *Orthezia insignia*, were not completed owing to the scarcity of material in Kenya. Further efforts to obtain stocks are being made.

F. B. NOTLEY,
Entomologist

ANNUAL REPORT OF THE ENTOMOLOGIST, MOROGORO, FOR 1949

COTTON PESTS

From information kindly supplied by the Entomologist, Empire Cotton Growing Corporation, Ilonga, it is clear that the pest populations in the Morogoro and Kilosa districts have been generally small and have rarely reached dangerous proportions. American bollworm, *Heliothis obsoleta*, Fabr. was generally present in small numbers only, a fact which may have been correlated with the general failure of the maize crop, this being the alternative host. For the Eastern Province as a whole damage by this pest is reported to have been on a smaller scale than usual.

Some damage occurred to late maturing cotton in the Morogoro area as a result of attack by larvæ of the pink bollworm, *Pectinophora gossypiella* Saund., and severe damage on both the rain and flood grown cotton in the Rufiji area.

Three Entomological Instructors made a prolonged search south of the cotton area of the Rufiji delta for the red bollworm, *Diparopsis castanea*, Hmps., which it is feared may have advanced northwards from the Lindi district. Of the few pupæ collected from the wild cotton *Gossypiodes Kirkii*, only one has hatched out and authoritative opinion is that the moth is of a species different from the true red bollworm.

Cotton stainers of the genus *Dysdercus* have been few in number throughout the season.

OTHER CROP PESTS

Cassava, a food crop in the Lake Province, has been widely and heavily attacked by a scale insect, provisionally identified as *Aonidiomytilus albus*, Okli. According to local reports the scale infestation first became obvious in

February and has since spread with rapidity throughout Ukerewe Island and the district around Mwanza. Observations in the Laboratory indicate a minimum of only twenty-eight days for the life cycle. This, coupled with the long-egg-laying period which results in overlapping generations, goes far to explain the rapid increase of the pest. Laboratory experiments indicate that the distribution of the scale comes about through the careless bundling together of clean and infested planting material. In attempts to cleanse already infested planting material with various insecticide solutions a dilute DDT/oil emulsion has shown much promise. In recent samples of infested cassava cuttings from Ukerewe Island, where the infestation is reported by the Entomological staff to be subsiding, a number of predatory coccinellids, *Chilocorus distigma*, Klug., have been discovered. An outbreak of this scale, which has been previously recorded from the Rufiji area, appears to be correlated with dry conditions.

Further damage to cassava by the Elegant Grass-hopper, *Zonocerus elegans*, Thng., has occurred in the Tabora and Morogoro areas. This pest normally persists from late August until the middle or end of January when egg-laying takes place; as cassava is being constantly invaded throughout the season control measures are difficult to apply. Preliminary experiments with gammexane emulsion sprays have given good kills, but the necessity for repeated applications make the method uneconomical. It is hoped that observations which are being made on the egg-laying sites may prove useful in adopting control measures. Light infestations of cassava by larvæ of the Lepidopteron leaf defoliator, *Acrea acerata*, Hew., and a new species of cassidid beetle have been recorded from Ukerewe Island.

Army worms, *Laphygma exempta*, Wlk., and *L. exigua*, Hiibn., caused severe damage to crops in the Tabora area in January and have also been reported from the Lake, Northern and Tanga Provinces. Early crops of maize were damaged in the latter area in March and April, but the attack fortunately died down with the onset of the rains. Maize has also been subject to the usual depredations of stalkborer, *Busseola fusca*, Fuller, in some inland areas, mainly around Tabora and Dodoma. *Procera argyrolepida*, Hmps., the stalkborer in the coastal regions, has been of little importance this year.

Sporadic attacks on maize were also made by snails in the Southern Province. Trials with metaldehyde mixed with sorghum meal to form a bait are stated to have been successful against this pest. An unidentified Gelerucid beetle which does not appear in the rainy season has done much damage to valley-bottom maize in the Tabora area by eating the silks.

Flea beetle, *Aphthona bimaculata*, Jac., severely damaged sesame in the Southern Province, the attack lasting from February to April.

Beans in the area around Moshi have been attacked by the leaf-eating beetle *Hallirhotius africanus*, Jc., and an unidentified caterpillar has been reported on the same crop at Ufipa in the Western Province.

Species of Callidea bug have been recorded on sunflower growing in the Western Province, but appeared to be doing little damage.

The incidence of onion thrips, *Thrips tabaci*, Lind. was very heavy in October; trial plots at Makere and Kasulu in the Western Province were completely ruined by this pest.

PLANTATION CROP PESTS

From the Southern Highlands tobacco area three pests of importance to the industry have been recorded. Newly-planted tobacco in the Iringa district was severely attacked in the year by cutworm, *Euxoa segetum*, Schiff., some damage was also caused by this pest to tobacco in Songea. Tobacco root-knot eelworm, *Heterodera marioni*, was prevalent in Iringa, and in May and June was reported as becoming a major pest. The tobacco beetle, *Lasioderma serricornis*, F., was found in stored tobacco in Iringa and legislation to prevent the further spread of this pest has been suggested.

Of coffee pests, coffee berry borer, *Anthonus leuconotus*, Pasc., has occurred in one or two areas in the Southern Highlands Province, and a Coccid bug of the genus *Saissetia* has been identified on coffee leaves received from Bukoba. This latter is not regarded as of great importance from the economic point of view.

APICULTURE

Figures for the exports of beeswax and honey in the latter half of the year are not yet available but those for first half of the year are given below in comparison with the corresponding figures for 1948.

Period			Beeswax Quantity in cwt.		Value £		Honey Quantity in cwt.		Value £
January-June, 1948	...	...	5,918	...	94,118	...	1,850	...	5,236
January-June, 1949	...	...	5,576	...	76,064	...	751	...	1,896

The fall in the export figures for these commodities is probably due to the effect on production of the low rainfalls of 1949.

Encouragement of the native beeswax industry has for a long time been one of the important functions of the laboratory and beeswax instructors from here have spent much time recently in the Tabora area and around Morogoro demonstrating the Sudan type of hive.

In December a Beeswax officer was appointed to Tabora and from now on all beeswax problems will be handled by him.

ACKNOWLEDGMENTS

I have to acknowledge the assistance of Dr. W. J. Hall, and the staff of the Commonwealth Institute of Entomology (identification of insects) and Mr. H. J. de S. Disney, Entomologist, Empire Cotton Growing Corporation, Ilonga, for information about cotton pests.

G. SWAINE,
Entomologist

BOTANIST

WEATHER

The rainfall was the worst recorded in eighteen years. A long dry spell from January to the end of March was broken by only one good shower in February; April rainfall was good, but there was very little in May. In these

conditions, yields were unsatisfactory. The planting rains for the 1949-50 season were late, the first real rain falling on 8th December.

Rainfall Figures		Inches of Rain	No. of Days
January	... ..	1·23	5
February	... ..	1·76	12
March	... ..	0·32	5
April	... ..	7·24	21
May	... ..	0·73	7
June	... ..	0·05	1
July	... ..	0·06	1
August	... ..	0·12	2
September	... ..	0·53	4
October	... ..	1·03	7
November	... ..	0·74	6
December	... ..	5·70	18
Total for year ...		19·51	89

A. UKIRIGURU

Selection Work.—The main aim is to obtain an early-maturing sorghum which will store well. Attention is also being given to later-maturing sorghums, selections being made for all important plant, panicle, and grain characters. Resistance to stalk-borer and Striga are also being looked for, but may prove difficult to obtain.

There is little doubt that hard grains which will store well can be obtained in the early-maturing sorghums, but they are rare. Preliminary tests are being done with 100 grains of each selection in a weevil-infested bulk of another variety. These tests are very rigorous, as the weevil population builds up to very large numbers in the bulk, and where material is available, two lb. samples are infested separately with fifty weevils each, which should give a better comparison. Twenty of the 950 selections made this year appear to store well, but may not have good field characters.

The Sunflower selection work aims at obtaining varieties of suitable maturity period and height, non-shattering, giving a high yield of oil per acre. Analyses made by the Government Chemist show a range of oil content from 25·5 separate selected heads of from sixteen per cent to forty per cent oil in undecorticated seed, so there appears to be room for improvement by selection.

The maize selection work aims at finding types which combine earliness of maturity with a better degree of drought-resistance. This year, eighty-one selections were made. It is hoped to select for resistance to streak in Uzinza in 1950, but this year symptoms were not showing at all clearly, owing to the drought.

High yielding, drought-resistant legumes are being selected, and better yield in the Setaria, Panicum and Eleusine Millets is being looked for, but very little progress was made as these crops were very poor indeed, due to drought.

In Cassava, the various mosaic-resistant varieties obtained from Amani are being rogued and examined for incidence of mosaic. So far, seven clones seem to be very resistant: the seedling material is being planted in progeny rows this season for study.

Experimental.—Little experimental work could be done owing to my arriving after the planting season had begun.

Sorghum.—The Striga trial, a comparison of clean-weeded and unweeded plots (the latter receiving one initial weeding) gave results consistent with those obtained in previous years:—

Clean weeded	...	530 lb./acre.
Not weeded	...	10 lb./acre. (Variety Bukura Mahemba).

There has been an accumulation of Striga seed in the unweeded plots, and a progressive reduction in the weeded plots over a period of years. This year, the depressing effect of the Striga in the unweeded plots was very marked before any Striga plants were visible above ground.

An experiment laid down for the Plant Pathologist indicated that Sulphur, Normosorn, and T.M.T.D. seed dressings greatly reduce the incidence of grain smut. The incidence of smut was too low for definite conclusion to be drawn.

An observation on the effect of the selective weed-killer Y.F. 1541 on weeds on the mbuga in a sorghum crop failed owing to drought. There was no indication of any effect under the dry conditions prevailing.

BULKS AND REFERENCE COLLECTIONS

The sorghum reference collection on the Mbuga, planted 18.11.48, was severely affected by the drought. Early Hegari (ex U.S.A.) which matured first, gave 850 lb./acre. P. 41 (ex Swaziland), which was slightly later, gave 650 lb./acre. The remainder, all later in maturity, yielded from 150 to 400 lb./acre. A great deal of mixing and hybridization has evidently taken place in the sorghum here, and in 1950 they will have to be reselected.

The legume reference collection was very poor, only the velvet beans on the hill being outstanding for drought resistance, surviving as very poor plants until the April rain when they grew very strongly.

BULK YIELDS

Crop				Yield lb. per acre	Year of Manuring	
<i>Sorghum.</i>						
P. 41	...	...	...	900	...	1947
P. 127	...	...	...	550	...	1946
P. 133	...	...	...	650	...	1946
Dobbs	...	...	...	700	...	1946
B.C. 27 white	...	...	...	630	...	1948
<i>Maize.</i>						
Katumbili	...	...	...	3½ bags	...	1947
<i>Sunflower.</i>						
Local mixed	...	...	...	230 lb.	...	1948
<i>Bulrush Millet.</i>						
Local Native	...	...	...	3 bags	...	Not manured.

Sweet Potatoes.—A reference collection of sweet potatoes from all over the Territory is being established, and members of the Department are kindly assisting by collecting planting material.

Introductions.—Forty-nine varieties of sorghum, six varieties of millet, three varieties of cassava, four varieties of sunflowers, and nine varieties of legumes have been received from various parts of the Territory, the Overseas Food Corporation, the West Coast of Africa, Rhodesia and India.

B. MWABAGOLE

Weather.—The drought limited the acreage under cultivation of rice owing to the small capacity of the irrigating pump. A new pump has now arrived, and will be installed in 1950. This will allow of the proper irrigation of the twenty-two acres normally under rice, and extension of the area if necessary in the future.

Selection Work.—Over 100 selections were made for earliness of maturity, grain characters, straw strength and tillering. Non-Shattering and straw strength are important characters to which special attention is being paid.

Experimental.—In a variety trial of fourteen selections from Kahogo, 7/13 gave a significant increase in yield of ten per cent over the Kahogo control (4,620 lb. per acre compared to 4,180 lb. per acre). The remaining thirteen varieties did not differ significantly from Kahogo in yield. None of them showed better field characters than Kahogo.

Variety Trial.—This was a comparison of seven rice varieties and selections laid out in randomized blocks with ten replications. The following yields were obtained :—

Variety or Selection				Yield (lb./acre)	Per cent of Kahogo	
2/16 (ex Afaa Kilombero)	...	...	...	4,000	...	119
Majimaji	...	...	...	3,980	...	118
1/18 (ex Afaa Kilombero)	...	...	...	3,953	...	117
Afaa Mwanza	...	...	...	3,410	...	101
Kahogo	...	...	...	3,370	...	100
2/9	(ex Afaa Mwanza)	...	...	3,350	...	99
2/8		...	...	3,280	...	97

Significant Difference ($\cdot 05$) = 325 lb./acre = 9.6%.

These yields tally well with results obtained in previous years. 2/16 (ex Afaa Kilombero) has outyielded Afaa Mwanza in previous trials by thirty-one per cent and forty-six per cent and was graded in Mwanza in 1944 as being of slightly better quality, giving a better polished rice than Afaa Mwanza. It is inferior to Kahogo.

PUDDLING IN OF GREEN MATERIAL

Eight treatments were applied on plots 20' x 20' (Latin Square lay-out). The harvested plot size was 1/129 acres. The treatments consisted of trampling in varying quantities of green material and farm-yard manure immediately before transplanting the rice. This was a departure from practice in previous years, when from a fortnight to a month was allowed to elapse between the trampling in and the transplanting of the rice.

Treatment (tons/acre)		Yield/acre (lb. of Paddy)	Per cent of Control	Yield/acre (lb. of Straw)	Per cent of Control	Tillers per plant
Cassia 4 tons	...	6,670	128	6,650	152	7.2
Tree Cassava 4	...	6,330	122	5,900	137	7.5
Pen Wastes 4	...	6,200	119	4,820	112	7.0
Cassia 2	...	6,180	119	5,650	131	7.4
Physic Nut 2	...	6,120	118	5,440	126	6.8
Tree Cassava 2	...	5,860	113	5,100	119	6.9
Puddled only	...	5,460	105	4,510	105	7.0
Control	...	5,200	100	4,300	100	6.7

In 1948, the increase in grain yield of the tree cassava 4 tons and cassia 4 tons was about forty per cent (Paddy) over control, but the yield of the control treatment was very much higher this year (5,200 lb./acre compared to 3,440 lb. acre in 1948). The yield of straw has, so far, always shown much greater increases than the yield of grain relative to control.

Broadcasting into Water.—An observation trial comparing the broadcasting of soaked seed into 2" of water with ordinary transplanting was carried out. Germination of the seed broadcast into water was poor, but the greater tillering in the resulting poor stand compensated to some extent for this. The yields (Kahogo variety) of the plots were :—

Broadcast into water 248 lb. (Average 5 oz. per plant)

Transplanted 370½ lb. (Average ¾ oz. per plant)

Bulks.—The main bulks of Kahogo and 2/16 were yielding between 2,000 and 3,000 lb. per acre, the dry conditions and limited capacity of the pump resulting in late transplanting and lower yields than would have been obtained with a proper water supply. The small quarter-acre bulks of different varieties which received a good water supply yielded well, twelve varieties giving over 4,000 lb. per acre, and ten varieties yielding from 3,000 to 4,000 lb. per acre.

Introductions.—114 rice varieties from various parts of the Territory, and from other parts of Africa were received during the year, and will be grown for observation in the coming season.

C. MISCELLANEOUS

It was possible to devote some attention to the collection and identification of grasses, and next season attention will be given to legumes as time permits. A visit was made to the Lake and Western Provinces to obtain herbarium specimens and gum samples of *Acacia* species.

D. 1949-50 PROGRAMME

Exploratory experiments on sorghum, rice and millet have been laid down. The sorghum experiments include a long-term trial of the effect of various crop rotations and weeding treatments in controlling *Striga*: spacing, weeding, and time of planting trials: a manurial trial on the mbuga, compost and phosphate, and soaking of seed in nutrient solution on the hill: and two variety trials.

The rice experiments include variety trials spacing, clump planting, weeding, and methods of planting trials: and several trials to explore more fully the effects of puddling in of green material.

The millet trial is an exhaustion experiment, comparing continuous cultivation, grazing of stover, and manuring on plain millet and millet interplanted with legumes.

The selection programme will be continued along the lines already outlined above.

H. DOGETT,
Botanist

ANNUAL REPORT OF THE FISHERIES OFFICER (INLAND FISHERIES) 1949

GENERAL

A three-year plan for Fisheries work was approved in 1949 and capital funds were voted for the construction of an office and laboratory at Kigoma and for the provision of a Motor Fishing Vessel for Lake Tanganyika. It was not possible to undertake the building during 1949 but the fishing vessel is already on order and it is hoped that both these projects will be completed in 1950.

The broad programme entails a survey of the fisheries of our entire coast line of Lake Tanganyika. This can only be undertaken when the Motor Fishing Vessel is in commission. In the meantime preliminary work on Lake Tanganyika has consisted of a detailed investigation of the native fisheries in the vicinity of Kigoma with visits to other areas of the Lake as opportunity afforded, the collection of data on the many species of fish in this Lake and assistance to African fishermen in the Kigoma District. Supervision of the Lake Rukwa fisheries has continued. Some minor waters in the Western Province have been investigated and a fishery in the Malagarasi Swamps has been discovered to be of considerable economic importance.

Mr. Lockley represented the Territory at two meetings concerned with the planning of future Inland Fisheries work in East and Central Africa. The first of these, the Anglo-Belgian Inland Fisheries Conference, held at Elizabethville in June, was attended by delegates from all the British and Belgian Territories in East and Central Africa and by representatives of the British and Belgian Governments. The second, held at Jinja in July, was the inaugural meeting of the East African Inland Fisheries Research Advisory Committee of which Mr. Lockley is the member for Tanganyika. A wide range of technical problems was discussed at both these meetings and a considerable degree of co-ordination in future planning achieved. Of outstanding interest to Tanganyika is the proposal of the East African Fisheries Research Organization to establish a sub-station at Kigoma for fundamental fisheries research work designed to benefit the inland fisheries of the East African Territories as a whole.

LAKE RUKWA

1949 was a year culminating in disaster for the Lake Rukwa fisheries. The paucity of the rains in the Rukwa catchment area over the past few years has had a cumulative effect on this extremely shallow lake. The rains of the 1948-1949 season were almost a complete failure and the water entering the lake from its affluent rivers and by direct rainfall did little to counteract the losses by evaporation. As the year progressed, the rate of evaporation was undoubtedly speeded up by hot, dry winds which, sweeping across the lake from varying directions, caused a "tidal" effect by periodically spreading the remaining waters of the lake across large areas of mud-flats and thus increasing the surface area available to solar evaporation. By the middle of the year the whole of the relatively shallower North Basin of the lake had completely dried out. The South Basin, in which the commercial fisheries are situated, is estimated to have a normal surface area of 360 square miles. When the Fisheries Officer visited this area at the beginning of October it was estimated that 150 sq. miles of water were left. The South eastern shore line had retreated from half to one mile and it was then possible to drive a car from one end of the lake to the other across what had formerly been

the main fishing grounds. Dessication continued right up until the end of the year and, in December, the Game Ranger, Mbeya estimated that the lake was ninety-eight per cent dry.

The progressive effect of the drought on the ecology of Lake Rukwa has been considerable and complex. Two factors, which may have already had profound effects before the actual reduction of the waters commenced, were the failure of the rivers to bring in a sufficient complement of nutrient salts for full phytoplankton production and the failure of the rains to check the slowly increasing alkalinity of the water. The presumed reduction in the available supply of dissolved oxygen probably had an early effect on such fish as *Hydrocyon* and *Labeo* which are usually associated with well oxygenated waters. Apart from the question of its food supplies and direct physical effects, production of the main economic species of fish in the lake, *Tilapia rukwaensis*, would be early effected by a reduction in the available shallow water areas as this species requires to construct a nest-depression for breeding in such areas. Secondary effects have also been of significance in substantially altering the ecological balance of this lake. For instance, there has been a very heavy mortality amongst the considerable herds of hippopotami which made such a valuable contribution to the fertilizing of the lake and the shallowness of the water has enabled vast flocks of fish-eating birds, especially pelican, to reap an abnormally large harvest.

In considering the progressive effect of the drought on the *Tilapia* stocks it must be remembered that the only data available are from the limited inshore areas of the lake in the Chunya district where both the European and African commercial fisheries were concentrated. The fishing grounds here lay inshore of the deepest water in the lake and it is in this area that the remaining waters of the lake are concentrated. The general chaos ensuing as a result of the drought makes the interpretation of statistics collected during the year a difficult problem, as for example, the physical difficulties involved in hauling seine-nets or in launching canoes across vast areas of unstable mud-flats may have affected catch results as much as deterioration in the stock at one stage and makes it unwise to compare closely effort units such as canoe-days or seine-hauls with those of former years.

What may well be considered a significant indication that the *Tilapia* stocks were already heavily depleted before 1949 either by over-fishing, by the effects of several years drought or by a combination of both, is the fact that no abnormally heavy catches were made in the final stages of the fishery when the surviving fish populations could be presumed to be concentrated in the remaining waters. The heaviest catches in the local canoe fishery were made in June (forty-four fish per canoe-day), in the European seine fishery in August (total of 165,000 fish). (Catch per effort figures not available). Even taking into account the reservations noted in the foregoing paragraph as to the effect of physical difficulties, these catches only represent the output of a moderate fishing month in former years. These results may be contrasted with those obtained for another species of fish *Synodontis zambesiensis* ('konje'). The konje was not fished for on any scale commercially, but a few thousand fish a month were caught by the native industry. From March to July the take of konje remained steady at an average of 4,000 fish per month, this catch doubled in August but in September-October no less than one and a half million of this species were removed from the remaining waters of the lake.

At the beginning of 1949, three European concessions were in operation. As in former years, February was a close season. One concession terminated in June and was not renewed by Government. One of the remaining concessionaires voluntarily ceased to fish in October. In October a decision was taken by Government to restrict fishing to that necessary for subsistence by the lake-shore people and a number of measures were introduced to prevent trading in fish.

By the end of December, 1949, Lake Rukwa had not begun to refill. The only species of fish then being caught by native fishermen was the ('kambali') (*Clarias mossambicus*) and the fate of *Tilapia rukwænsis* was uncertain. It remains to be seen, after the rains, whether a small stock may have survived in the remaining waters around the Songwe River. It should be emphasized that the Rukwa *Tilapia* is an endemic species and, as it has never been successfully introduced into other waters, no stocks are available from elsewhere. If some fish have survived the final stages of the drought there is every hope that the species will re-establish itself and it would be unwise to consider the introduction of any other species of *Tilapia* until *T. rukwænsis* has been given the opportunity of recovery.

The effects of the drought have invalidated a number of the recommendations made by the Fisheries Officer and others and have necessitated a reconsideration of plans for exploiting the fishery to best advantage. It is fortunate that no new capital expenditure was embarked upon and present events should be sufficient warning against any over-optimistic plans based on past results in this fishery.

In 1949 about one million *Tilapia* were marketed, in various forms, by the European and African industries combined. This is an estimated weight of 500 tons of fresh fish and an approximate market value of £6,000. There is no regular market away from the lake shore for the other species of fish caught, most of which are consumed locally. The very heavy catches of 'konje' made towards the end of the year found very little outlet other than locally, although a certain quantity were taken as a speculation by itinerant traders. The konje is a small, spined catfish, averaging only 3 oz. in weight when fresh. The attached table ('Table A') summarizes the results of the canoe ('Luelo' or scoop-net) fishery. No detailed figures are available for the European seine fishery.

TABLE A

Catches of the canoe (luelo) fishery at Lake Rukwa in 1949.

Month	No. of canoe days	No. of Ndege (<i>Tilapia rukwænsis</i>)	No. of Kambali (<i>Clarias mossambicus</i>)	No. of Konje (<i>Synodontis zambesiensis</i>)
January	678	16,744	256	991
February	Close Season			
March	2,482	65,401	1,985	2,047
April	2,902	65,541	457	3,856
May	3,051	95,694	1,562	5,025
June	2,753	122,535	2,786	5,674
July	2,480	54,063	1,323	3,731
August	1,959	30,931	1,428	7,086
September	2,533	2,540	398	1,262,669
October	1,348	404	266	397,045
November	2,222	3,201	3,098	—
December	1,247	—	20,652	—
Totals	23,655	457,054	34,211	1,688,124

Crocodiles.—A crocodile hide business was prosecuted with vigour during the year and over 1,000 beasts were accounted for. The bulk of first quality Rukwa skins are sold for export to the United States and for various reasons, including devaluation of sterling, very good prices are now being paid for the wet-salted skins. There is a large potential market for good quality, well-preserved crocodile belly skins but there is little or no demand for hides marred by "butcher cuts", with a high incidence of "buttons" or for shade or sun-dried skins.

The Rukwa industry has had a profitable year but has been beset with many difficulties due to the drought. As it has not been possible to operate a motor-boat on the lake for the latter half of the year, many areas could not be reached. Many crocodiles have undoubtedly perished due to the drought—possibly due to their intolerance to the increased alkalinity of the water. Several observers flying over Rukwa have reported seeing large numbers of rotting crocodile carcasses (and also hippopotami). There is every reason to hope that when the lake is restored to fishing productivity it will be found that the crocodile menace has been considerably reduced.

LAKE TANGANYIKA

It is gratifying to record that the Lake Tanganyika fisheries have had a good year and that, although the lake is already supporting a fishery of major economic importance, the preliminary investigations of the Fisheries Officer indicate possibilities for considerable expansion amongst the African fisheries.

Lake Tanganyika is dominated by the "dagaa" fishery which involves species of fish and fishing methods which are unique to this lake. Dagaa are small sardine-like fish of the family *Clupeidae*. Two species, both endemic, are involved; *Limnothrissa meodon* and *Stolothrissa tanganicæ*. Whilst the relative roles of these two species in the fishery has not yet been worked out it can already be said that the bulk of the dagaa catches consists of *Stolothrissa* which is the smaller of the two species. Dagaa may occur in considerable shoals and both shoaling and the movements of shoals themselves are subject to much variation and seasonal fluctuation with indications of horizontal migrations both along the main North-South axis of the lake and from deeper water to inshore; there may also be vertical migrations of diurnal or greater periodicity.

Dagaa are fished for at night and only during moonless periods. The fish are attracted and concentrated by flares which are, in fact, simple open fires carried forward of the canoe. They are then scooped up in large dip-nets made of mosquito netting. The fish are sun-dried by spreading on the sand and the bulk of the catch is marketed in this form.

The majority of the fishermen of the lake are mainly engaged in the lucrative dagaa fishery and fisheries for larger species of fish (especially of those kinds appealing to the non-African consumers) are of very minor importance at present and there is virtually no export away from the lake shore of fish other than dagaa. In referring to the fisheries other than 'dagaa' it is convenient to use the term "demersal", as opposed to "pelagic" for the 'dagaa' fishery.

Except in the vicinity of Kigoma and Ujiji, both the lake shore and the immediate hinterland is very sparsely-populated and what population there is consists mainly of peasant-fishermen. With the exception of 'dagaa' which,

because of the ease with which it can be caught in bulk, cured and transported in good condition, has been the ideal fishery cash-crop, there has been no incentive for the fishing population to increase production of the demersal species beyond their own subsistence needs.

The demersal fisheries, where they are above subsistence level, are mainly concentrated in the Kigoma-Ujiji area and their present production is totally inadequate to meet the needs of the population in that area. For example, in December, a month in which very careful records were compiled, a total of only 3,000 lb. of fresh fish was brought for sale in Ujiji market which caters for the needs of a population of 18,000. The shortage of fresh fish at Kigoma has been so acute that native traders have found it profitable to bring fresh fish by rail from the Malagarasi Swamps at Nguruka—a rail journey of 191 kms.

This problem is one of a shortage of fishing effort rather than a shortage of fish for there is every reason to believe that the fish stocks in this area are not being adequately exploited. On the other hand there is an evident need for new or improved fishing techniques and gear; for a regular and reasonably-priced supply of twines, nets and other material and for the organization of marketing to be such that it benefits the primary producer and the consumer rather than the middleman.

Two initial lines of development are therefore indicated for Lake Tanganyika. The fostering and improvement of the 'dagaa' fishery which will remain the chief export trade and on which the scattered fishing populations of a greater part of the lake shore must continue to rely for cash, and the expansion of the demersal fisheries to meet the full requirements in the more heavily populated areas, notably Kigoma-Ujiji. Supplementary to this is the expansion of the demersal fisheries in the remoter areas and, by the introduction of improved methods of curing, to encourage the production of an exportable surplus.

A beginning has been made in the Kigoma-Ujiji area in 1949. Demonstrations have been given with gill-nets and there has been a brisk demand for this type of gear. The Fisheries Officer has been able, with the aid of Native Authority funds, to purchase a considerable quantity of unserviceable motor tyres for resale to local fishermen who make their seine nets from the thread picked from these tyres. This scheme has been particularly successful and the demand for tyres invariably exceeds the supply. Control and supervision of marketing has been tightened up and a new fish market will be built on Ujiji beach in 1950.

The bulk of dried 'dagaa' from the whole of the lake shore, including the Mpanda and Ufipa Districts, passes through Kigoma for export and there are therefore reliable figures of both production and export available. In 1949 approximately 1,500 tons of dried 'dagaa' (equivalent to 4,500 tons of fresh fish) of a value of £75,000 were exported from Kigoma. Taking into account local consumption, export by road and dhow (of which there are no records) and direct export by the fishermen at the north and south ends of the lake to Ruanda Urundi and Northern Rhodesia respectively, total annual production has probably been nearer 2,000 tons.

There has always been a considerable export of 'dagaa' from Kigoma to the Belgian Territories and, in recent years, this has frequently been at the expense of Territorial needs especially in view of the ever-increasing demands

of large-scale employers of labour for protein rations. The growing importance of 'dagaa' within the Territory is shown in the following *Table B*, an analysis of exports over the past three years, which shows an increase each year in the percentage quantities railed within Tanganyika from 35 per cent in 1947, to 58 per cent in 1948, to 65 per cent in 1949.

TABLE B

B=to Belgian ports by lake steamer.

T=Territorial destinations by rail.

All figures in tons.											
1947						1948			1949		
			B	T				B	T	B	T
January	...	...	12.6	25.3	...	122.0	85.9	...	42.9	95.1	
February	...	...	24.7	51.7	...	73.5	109.2	...	50.4	133.0	
March	...	...	55.0	51.9	...	72.1	52.1	...	24.7	73.4	
April	...	...	78.1	24.0	...	15.4	8.5	...	35.8	23.3	
May	...	...	50.4	31.6	...	19.4	20.4	...	3.2	17.8	
June	...	...	48.9	22.5	...	6.2	7.2	...	8.8	26.4	
July	...	...	81.8	18.8	...	14.4	76.3	...	15.5	55.8	
August	...	...	69.1	26.5	...	166.4	66.9	...	23.2	78.0	
September	...	...	154.9	55.4	...	91.2	93.0	...	105.2	224.2	
October	...	...	177.3	55.5	...	63.6	80.0	...	79.3	103.8	
November	...	...	63.9	43.9	...	57.6	107.9	...	121.4	54.2	
December	...	...	61.3	45.6	...	61.8	106.9	...	12.8	71.0	
			378.0	452.7	...	763.6	814.3	...	523.2	956.0	
			1,330.7	...	...	1,577.9	...	...	1,479.2	...	

Experimental fisheries work on Lake Tanganyika has been limited during the year due to the Fisheries Officer's lack of a full-time vessel and crew. Nevertheless a number of trials have been conducted with trammel-nets and gill-nets mainly with the purpose of sampling the fish populations in the inshore waters off Kigoma. A considerable amount of data has been collected from this source and from an examination of native caught fish. In addition, a collection of fish has been made from the Luiche River and Swamp during the course of the reclamation work conducted there this year, which has yielded data of some value.

Particular attention has been paid to correctly identifying the scientific names of the various species of fish against the local names in use. This is an essential preliminary to the interpretation of statistics collected by native recorders from a lake where there are over two hundred different species of fish. A useful list has already been compiled, covering all the main economic species.

MALAGARASI SWAMPS

The vast area of rivers, permanent swamp and seasonally flooded grassland which is collectively known as the Malagarasi Swamp has been but little explored, especially from the fisheries view point. The available water area has been variously estimated from 700 square miles for the permanent swamps to 3,600 square miles for permanent and seasonal swamps combined. Such preliminary investigations as have been conducted indicate a rich and varied fish fauna which remains virtually unexploited.

The failure to exploit the fish resources has been due to two causes, the exceedingly sparse population of the swamp area itself and lack of communications to any market. Certain parts of the swamps are close to the Central Line and, in recent years, an increasingly important commercial fishery, which can evacuate its products by rail, has sprung up, notably in the area to the north of Nguruka Station.

Previously the fishery in this area had been conducted on a subsistence level by the indigenous natives but, in 1943, the large demand and high prices paid for smoked fish in the Belgian Congo led fishermen from Kigoma and Ujiji to exploit this area. An export trade in smoked fish, *via* Kigoma, was rapidly built up, but in 1946 the Belgians stopped imports on the grounds of the poor state of preservation of this fish. The industry, already established, then turned its attention to marketing its products along the Central Line and subsequently has had no difficulty in disposing of its entire output within the Territory. The main output is smoked fish but native traders take fresh fish by rail to Kigoma, Urambo and Tabora and even Dodoma and there is a subsidiary export of fish fried in palm oil. In 1949, 225 tons of smoked fish (equivalent to 675 tons of fresh fish) of a market value of £11,250 were railed from Nguruka station.

The area so far investigated by the Fisheries Officer is the permanent swamp, some twelve miles north of Nguruka, known as the Magoma-Katanda swamp with its headquarters at the fishing village of Katare. The fishery here is entirely conducted with gill-nets, mostly of $3\frac{3}{4}$ " to 4" mesh home-made from No. 50 khaki sewing cotton. Two methods are in use: driving into the nets by day for *Tilapia* and night-sets for other species. The former is the mainstay of the industry and the bulk of the fish exported is *Tilapia*.

Two species of *Tilapia* are involved: *T. nilotica*, widely distributed throughout Africa and *T. karomo*, hitherto only recorded from the outer delta of the Malagarasi River and described as a new species in 1948 as a result of the Belgian Hydrobiological Mission to Lake Tanganyika in 1946-47. Its occurrence is now established 100 miles upstream of the original discovery. Both species appear to be living side by side and may be caught in the same net. Their feeding habits appear to be similar as the stomachs of both species were found to be full of algæ and algal slime. The ratio of the two species is four to one in favour of *T. nilotica*. A sample catch of fifty-three specimens, from the same nets, examined on the 19th of August, was found to consist of forty-two *T. nilotica* and eleven *T. karomo*. Other observations made on this sample are summarized below:—

T. nilotica—42 specimens.

Length Range 16-20.5 cm. Mean Length 17.5 cm.

Weight Range 7-16 oz. Mean weight 9.7 oz.

20 males, 18 females, 4 sex uncertain. 13 females over 16 cm. were starting to breed. Gonads of males examined were considered to be quiet.

T. karomo—11 specimens.

Length Range 16.5-21 cm. Mean length 19 cm.

Weight Range 8-14 oz. Mean weight 10.4 oz.

8 females; 3 males. One female of 16.5 cm. and two males of 19 and 21 cm. were starting to breed.

Tilapia appear to be exceedingly abundant in this swamp and not less than three million fish per annum have been caught here over the past three years. The conditions favourable to *Tilapia* production in the swamps require investigation as local fishermen report that there are no *Tilapia* in the large Sagara swamp which is south of the railway line at Nguruka.

The night set-net fishery catches a great variety of other species of fish notably of the families *Characidae*, *Citharinidae*, *Mormyridae* and *Clariidae*. This swamp has a connection with the Malagarasi River by its tributary the Magoma, which flows through the swamp and three elements appear to be present in the fish fauna; true swamp-dwellers such as the Catfishes of the family; riverine species such as the *Mormyrids* and certain species of *Alestes* of the family *Characidae* and finally species such as *Alestes macrophthalmus* which are normally associated with the open waters of Lake Tanganyika and have presumably ascended the Malagarasi River.

There are very great possibilities for fisheries development in the Malagarasi area but expansion by African enterprise is at present limited by lack of access to markets. The Malagarasi region is a potential development area and any developments near the swamps, especially any increase of communications, is likely to lead to the establishment of fisheries of considerable volume and value.

MISCELLANEOUS

Of various small stretches of water investigated in the Western Province during the year, Lake Lugoye, a small lake some five miles east of Kasulu, was found to contain fishable stocks of *Tilapia nilotica* and certain dams in Nzega District were considered to have stocking possibilities although it was found that such dams become naturally rapidly colonized by the Catfish *Clarias mossambicus*.

G. J. LOCKLEY,
Fisheries Officer (Inland)

ANNUAL REPORT, 1949

FISHERIES OFFICER, KOROGWE

Prior to my arrival in the Territory in December, 1948, a tour of the Belgian Congo and of Northern Rhodesia was arranged by the Colonial Office.

Very useful information was gained from this tour, particularly as regards the technique of fish farming in Africa to supplement my previous experience in Palestine.

Some three months were then spent in touring the Territory to make a survey of fish farming potentialities, mainly in the Southern Highlands, Eastern, Central and Tanga Provinces, which from a topographical aspect seemed most promising.

At the conclusion of this tour, it was decided that two Experimental and Breeding Stations should be constructed, one at Korogwe in Tanga Province, and the other at Morogoro in the Eastern Province.

The choice of these sites was dictated by the abundance of suitable perennial water, ease of communications for distribution, and a concentration of African labour on the sisal estates, constituting a ready market for the consumption of fresh fish, thus obviating the necessity for preservation or refrigeration.

As the primary object of fish culture in this country must be to feed the African population, the necessary funds were made available for the construction of these two stations.

My headquarters were established at Korogwe, and work on the Korogwe station was started. After a few minor set-backs occasioned by shortage of labour, a very satisfactory station has been built and was completed in November.

The station consists of six fry ponds each 40 feet by 20 feet, six breeding ponds, 120 feet by 40 feet, and one production pond 435 feet by 100 feet, the latter being approximately one acre in area.

Water is taken from the Pangani River by means of a furrow 700 yards long, and having a pH of 8.4 is ideal for fish farming.

Although only two months of the year remained for initial experiments, a very satisfactory commencement has been made at Korogwe. Suitable breeding fish of the species *Tilapia mossambica* have been caught in the Pangani River, and from 52 specimens put into one breeding pond, some 6,000 fry were collected after six weeks. These have been quickly grown to the fingerling stage in the fry ponds and used for stocking waters in Tanga, Moshi, Lushoto and Korogwe Districts.

It would appear that this species will breed throughout the year in Korogwe, producing some 6,000 to 8,000 fry every 5-6 weeks. A description of their breeding habits has been forwarded to the Fisheries Section, British Museum (Natural History), London.

Tilapia have been transported over great distances in the adult, fingerling, or fry stage. Journeys of 250 miles, taking 12 hours through the heat of the day with 50 adult fish, averaging over one lb. each, have been successfully accomplished without loss, and without the application of oxygen artificially.

Experience to date indicates that the high figure of production obtained in the Belgian Congo may be achieved in this country.

It is contemplated at Korogwe to experiment with six different species of *Tilapia*, the other five species being :

T. melanpleura from Belgian Congo.

T. macrochir from Belgian Congo.

T. esculenta from Lake Victoria.

T. variabilis from Lake Victoria.

T. rukwænsis from Lake Rukwa.

These species should give a wide range to suit environmental conditions in almost all parts of the Territory, particularly as regards food available locally, altitude, temperature and composition of water, salinity, and further, can render great assistance in malaria control.

The Fisheries Adviser to the Secretary of State visited Korogwe in July.

The Fisheries Adviser suggested that experiments should be made in the cultivation of rice under water, growing *T. mossambica* in the paddy fields concurrently with the rice, and harvesting both crops, simultaneously, after six months, as is the custom in Malaya.

Arrangements have already been made for these experiments to be undertaken in the coming year.

The Experimental Station at Morogoro is being built under the direction of the Provincial Agricultural Officer, Eastern and Central Provinces, and is now approaching completion. This station will provide a similar service to the Korogwe station for places in the vicinity of the Central Line.

A large number of tours have been made to various parts of the Territory, advising potential fish farmers, taking samples of water, and distributing adult, fingerling, and fry specimens for stocking purposes. Some 20,000 fry have been bred in the Korogwe station to date.

Technical officials of the Colonial Development Corporation visited Korogwe in November and were shown suitable sites and given preliminary data and costings for a 500-acre fish farm unit.

Visits were also paid by the Director of Agriculture, the Director of Water Development, the Provincial Commissioner, four Provincial Agricultural Officers, the Fisheries Officers of Kenya and Zanzibar, among many others.

A pamphlet has been published explaining the *modus operandi* of fish culture to the layman. This has evoked considerable interest, and requests for copies have been received from many of the Colonies and Protectorates in Africa.

I should like to place on record the valuable help received from the British Museum, London.

R. E. GOULD,
Fisheries Officer, Korogwe

ANNUAL REPORT, 1949

SENIOR TOBACCO OFFICER

Weather

This season the rainfall has been the lowest Iringa District has experienced for many years. Not only was the rainfall lower, but it was badly distributed. The cool weather was also earlier than usual and with high winds did considerable damage to the crop. Only a few scattered showers have fallen towards the end of the year and practically no planting has been done for the new season so far.

Curing

Due to the bad weather the standard of curing was below average with the exception of small plots of irrigated tobacco which was cured in January. This tobacco cured exceptionally well.

Grading

This season the grading was again done on the farms but due to the reason mentioned above, grading was much more difficult. It is gratifying to see how much trouble farmers are taking to improve facilities for grading. This is due to two reasons: (a) they are starting to realize that good grading pays, (b) most farmers now have long-term leases and are inclined to put up better buildings. Had it not been for the very poor season I feel confident farmers would have done much more in this respect.

TOBACCO, GENERAL

Ehlers again proved that it could stand up to almost any weather and gave a yield of 470 lb. per acre which was only about 30 lb. per acre less than when there was a good season. The imported varieties again were very much lower yielding where planted at high altitudes. The growers are at long last starting to realize that it does not pay to grow these varieties at this altitude. In most cases the yields only come to about 150 lb. per acre and most of the leaf cured green. At the grading shed it was a most difficult year as tobacco which did not seem to fit in with any of the standard grades kept cropping up. Due to this a new system was drawn up. Two records were broken at the shed this season (a) a total of 211,000 lb. was handled and processed at the shed during one month, (b) over 1,000,000 lb. was handled at the shed in six and a half months as compared with 800,000 in nine months last year. The total crop for this season was 1,710,816 lb.

Towards the end of the season there was a very big demand for any kind of tobacco and almost 200,000 lb. of tobacco which would have normally been secured was sold.

The Tobacco Board determined to put up more buildings at the grading shed and repair the burnt out drying rooms. This would be of great advantage to the industry as space is very limited at present and indications, weather permitting, are that a crop of between two and a half to three million pounds of tobacco may be produced next season. There should be no difficulty in selling the crops grown for the next few years at least and farmers are taking advantage of this fact.

Separate reports have been submitted regarding my visits to Kilosa, Morogoro, Tabora, Kigoma, Songea and Tunduru, and after visiting these districts it is evident that there are many places in Tanganyika very suitable for the production of the imported varieties of tobacco which would produce tobacco as good as the Rhodesian tobacco and there are possibilities of tobacco expansion in Tanganyika for air-, fire- and flue-cured tobacco.

PESTS AND DISEASES

Eel worm.—This pest is found on most farms in the district and even in seed beds.

Caterpillars.—During March caterpillars did considerable damage.

Cut worm.—This pest was severe early in the season, and some irrigated tobacco planted in September was very badly attacked by cut worm.

Stem borer.—Stem borer reported at Chimala was so bad that the seed beds had to be destroyed. This was the only place where stem borer did serious damage.

Tobacco Beetle.—About 30,000 lb. of last year's crop held over was very badly infested with beetle.

Kromnek.—At the beginning of the season kromnek was reported on one farm where a few isolated plants were infested, later it was found on several farms. In all cases it was seen on isolated plants only and did not seem to spread at all and the disease was found on one plant eighty miles from any other tobacco farms.

Mosaic.—This disease appeared to be much worse than in previous seasons. This is attributed to the poor rainy season which resulted in farmers taking seedlings from seed beds which had been drawn upon three or four times already.

Leaf Curl.—Very little leaf curl was found except on the low altitude farms where it was very bad.

Rosette.—The same applies to rosette as to leaf curl.

Frogs Eye.—This was noticed on the introduced varieties of tobacco only.

Stem Rot.—This was found on two farms. Infestation was not very bad.

White Mould.—This was bad only on the introduced varieties when planted at high altitude. These varieties on the other hand when planted at low altitudes were free. Seed beds on all parts of the district sown for the 1950 crop are badly attacked by white mould.

Angular Leaf Spot and Red Rust.—These diseases were observed where hail had damaged tobacco and where priming was not done properly.

K. B. LOUWRENS,
Tobacco Officer

MONTHLY RAINFALL IN INCHES FOR SEASON 1948/49 AND YEAR 1949
PROVINCE AND PROVINCIAL STATION

	EASTERN MOROGORO		CENTRAL DODOMA		WESTERN TABORA		LAKE MWANZA		SOUTHERN HIGHLANDS IRINGA		NORTHERN ARUSHA		TANGA LUSHOTO		SOUTHERN LINDI	
	Ins.	Average 30 years Ins.	Ins.	Average 11 years Ins.	Ins.	Average 39 years Ins.	Ins.	Average 22 years Ins.	Ins.	Average 19 years Ins.	Ins.	Average 26 years Ins.	Ins.	Average 35 years Ins.	Ins.	Average 10 years Ins.
October, 1948 ...	2.54	0.86	0.71	0.20	0.57	0.55	2.84	1.85	0.34	0.21	1.05	1.39	1.69	1.26	0.03	0.55
November ...	1.75	2.16	0.09	1.64	2.00	4.20	0.49	4.97	1.47	1.66	1.98	4.49	3.86	3.84	2.25	2.41
December ...	5.45	2.67	1.31	3.25	3.96	6.71	3.13	5.35	2.50	5.00	17.70	3.55	7.21	4.33	5.07	6.23
January, 1949 ...	3.65	3.93	3.92	5.27	1.88	4.99	1.14	3.77	4.62	7.64	0.97	2.23	5.56	2.94	6.84	5.93
February ...	1.66	3.75	4.51	3.17	2.96	6.01	1.56	4.39	4.43	4.96	4.16	3.40	1.69	2.99	7.26	3.81
March ...	2.46	7.37	2.66	5.13	2.69	6.78	0.21	6.25	2.65	7.21	0.90	7.16	1.38	5.92	4.17	6.38
April ...	5.26	8.33	0.70	1.64	4.45	5.33	7.93	5.33	1.44	3.58	21.27	14.11	6.41	9.22	4.76	7.32
May ...	6.49	3.75	0.00	0.16	0.41	1.11	0.98	3.81	0.26	0.55	2.60	8.29	2.22	7.39	1.81	1.37
June ...	0.21	0.77	0.00	0.05	0.00	0.12	0.52	0.69	0.00	0.04	0.13	1.41	0.63	2.20	0.00	0.39
July ...	0.81	0.54	0.00	0.00	0.00	0.00	0.02	0.60	0.00	0.01	2.21	0.49	1.14	0.17	1.13	0.24
August ...	0.05	0.39	0.00	0.00	0.00	0.04	1.15	0.81	0.00	0.02	0.02	0.83	0.25	0.86	0.14	0.21
September ...	0.03	0.67	0.00	0.00	0.00	0.30	0.89	1.91	0.00	0.10	1.00	0.86	0.14	0.70	1.16	0.54
Total for Season	30.36	-	13.90	-	18.92	-	20.76	-	17.71	-	53.99	-	32.18	-	34.62	-
October ...	0.06	0.91	0.00	0.25	0.27	0.55	0.99	1.89	0.12	0.22	0.01	1.37	0.29	0.38	0.44	0.51
November ...	0.12	3.71	0.00	1.51	1.17	4.14	3.73	4.78	0.05	1.65	0.96	4.40	0.29	4.44	0.36	2.39
December ...	2.03	2.76	4.80	3.09	5.91	6.64	12.37	5.25	3.34	5.07	4.50	4.08	3.21	4.41	3.89	7.15
Total for year 1949 ...	22.83	36.88	16.50	21.24	19.74	36.01	30.69	39.48	16.91	30.55	48.73	47.83	26.36	40.22	36.96	35.44

All figures quoted in above table are abstracted from Summary of Rainfall records for the years 1948 and 1949, Part II—Tanganyika East African Meteorological Department.

EXPORTS FROM TANGANYIKA OF AGRICULTURAL PRODUCTS
1945 TO 1949

The following table shows the principal exports of the Territory since 1945 with the values of those for 1949 :—

		Maximum out- put for export prior to 1948	1945	1946	1947	1948	1949	Total Value
			Amount	Amount	Amount	Amount	Amount	
	Year	Tons	Tons	Tons	Tons	Tons	Tons	£
Sisal	1942	136,237	110,637	111,521	95,856	117,092	132,541	11,111,232
Cotton Lint	1941	13,106	7,192	3,958	7,045	9,893	10,800	2,059,779
Coffee	1935	18,588	14,441	10,021	13,858	11,268	12,040	1,460,768
Groundnuts	1936	22,786	955	475	3,534	3,129	838	49,171
Hides and Skins	1947	4,609	2,259	3,527	4,609	3,310	4,059	624,508
Copra	1928	9,318	5	312	40	48	3,585	164,313
Sesame	1938	5,241	1,441	929	493	928	6	187
Rice	1941	17,965	2,171	70	2,615	6,450	1,547.6	40,096
Millet and Sorghum	1928	7,732	3,804	315	4,741	1,914	74.5	1,259
Maize	1948	3,070	20	—	1,875	3,070	105	712
Beeswax	1948	905	795	732	410	905	525	150,503
Tea	1946	625	400	625	446	462	427	69,708
Sugar	1941	5,454	1,130	315	838	568	5	169
Gums (Copal and Arabic)	1944	2,567	1,712	1,540	1,554	1,490	878	43,798
Ghee	1942	1,385	249	327	44	272	54.9	10,496
Wheat	1945	4,511	4,511	324	—	—	0.7	10
Tobacco (unmanufactured)	1948	1,421	935	924	667	1,421	1,073	217,536
Rubber	1944	1,314	2,320	1,019	49	54	18	3,780
Vegetable oils (Coconut and Groundnut)	1940	2,268	1,801	1,009	900	1,463	933.1	63,063
Papain	1948	130	101	100	109	130	119.8	91,801
Onions	1948	2,418	1,849	1,925	1,754	2,418	275	9,180
Pyrethrum	1945	697	697	668	241	170	141	26,100
Fats, including substitute for Ghee and Butter	1944	1,247	650	783	71	1,689	6	621
Mangrove Bark	1942	7,291	4,927	5,490	3,408	—	1,446	17,011
Sunflower	—	—	—	—	—	2,298	5,228	163,951
—	—	—	165,002	146,909	145,157	170,442	176,726.6	16,379,752

LIST OF EUROPEAN STAFF AS ON THE 31st DECEMBER, 1949

Director: C. E. J. Biggs, B.Sc.(Lond.), Dip.(Agric.) (Wye), Dar es Salaam.

Deputy Director: J. R. P. Soper, B.A.(Cantab.), Dar es Salaam.

Senior Research Officers:

F. R. Sanders, B.A.(Hons.), Dip.(Agric.) Cantab., Lyamungu, Moshi.

G. W. Lock, O.B.E., N.D.A., N.D.D., Mlingano, Ngomeni.

Entomologists:

F. B. Notley, M.Sc., A.I.C.T.A., Lyamungu, Moshi.

G. Swaine, B.Sc.(Hons.), Sheffield, Morogoro.

Plant Pathologist: G. B. Wallace, B.Sc., Ph.D., Lyamungu, Moshi.

Plant Physiologist: E. C. Diekmahns, B.Sc.(Hons.) (Glas.), Dip.Agric.(Cantab.), Ngomeni.

Botanist: H. Doggett, B.A., A.I.C.T.A., Ukiriguru, Fela.

Senior Agricultural Officers:

H. P. Smart, B.Sc.(Agric.), South Africa, Dar es Salaam.

C. J. McGregor, C.D.A., Arusha.

A. H. Savile, C.D.A., Morogoro.

N. V. Rounce, C.D.A., Mwanza.

A. Pitcairn, Dip.Agric.(Edin.), Dar es Salaam.

R. B. Allnutt, B.Sc., seconded to Leeward Island.

D. Thornton, B.Sc., Arusha.

H. Gillman, M.Sc., A.I.C.T.A., Dodoma.

R. J. M. Swynnerton, M.C., B.A., Dip.Agric.(Cantab.).

Agricultural Officers:

J. K. Robertson, B.Sc., A.I.C.T.A., Lindi.

T. C. Cairns, B.Sc., Arusha.

T. H. Marshall, Cert. Kew., F.R.H.S., Bukoba.

M. Lunan, B.Sc., A.I.C.T.A., Tabora.

J. B. Clegg, B.A., Malindi, Lushoto.

J. T. Purvis, B.Sc., Malya (Maswa).

T. S. Jervis, Bukoba.

R. W. Collett, Mbulu.

F. E. Luscombe, B.Sc., A.I.C.T.A., Moshi.

D. H. Drennan, B.Sc., Dip.(Agric.)(Cantab.), Mwanza.

H. L. Brett, Lindi.

E. T. Ward, C.D.A., Mbeya.

A. H. B. Childs, F.L.A.S., M.R.A.C., Kilosa.

C. G. Glegg, Dip.Hort.(Wye), Songea.

J. D. Hunter-Smith, B.Sc., A.I.C.T.A., Morogoro.

J. S. Gunn, B.Sc., Dip.Agric.(Cantab.), Mbulu.

W. G. Brookbank, Dip.Agric.(Cantab.), A.I.C.T.A., Tanga.

A. Jefferiss, B.Sc. (Hort.), Lushoto.

N. E. S. Mutter, B.Sc.(Agric.), Lindi.

D. G. Jones, Dip.Agric., Lyamungu.

C. C. Shapland, B.Sc.(Agric.), Dodoma.

I. Constantinesco, B.Sc.(Agric.), Arusha.

G. K. Reakes-Williams, B.Sc.(Agric.), Lindi.

H. Hamersley, M.B.E., B.Sc.(Agric.), Morogoro.

Education Officer: J. Hebenton, Ukiriguru, Fela.

Horticulturist: L. M. Fernie, Lyamungu, Moshi.

Senior Tobacco Officer: K. B. Louwrens, Iringa.

Tobacco Officer: J. H. McGregor, Biharamulo.

Agricultural Officer (Ginnery): E. Drackley, Mwanza.

Fisheries Officers:

G. J. Lockley, Kigoma.

R. E. Gould, Korogwe.

Beeswax Officer: F. G. Smith, B.Sc.(Forestry), Tabora.

Senior Agricultural Assistants:

W. C. Clarke, seconded to Montserrat.

A. A. E. Weirich, Tanga.

R. B. Silcock, Kilosa.

Agricultural Assistants: A. Taylor; B. R. D. Eccles; E. Pienaar; A. E. Favell; F. Parke; D. H. Thwaites; T. W. H. Dore; D. Shepstone; G. H. McGavin; L. J. Lloyd; P. G. Lewis; T. J. Taverner; V. Allen; J. C. Van Schoor; J. V. Morris; D. V. Jacob; W. E. Yeo; D. R. A. Goode; K. Johansen; J. F. Tregarthen; R. Simpson; P. Long; A. M. Pienaar; J. I. Thomson; W. F. Routledge; E. Hall; G. L. Goodhew; R. C. Faun; R. M. Kendall; J. Colston; V. C. Allen; K. H. Groves; R. C. Flint; L. B. Neary; J. M. Van Dyk; A. Jackson; T. E. Oliver; A. Priestner; J. Little; S. D. Pyman; W. J. Jones; H. E. Hubbard; R. G. N. Bickel; J. M. Ainley; R. A. Brown; B. J. Lumby; A. A. Spencer; W. I. Reece.

District Production Committees (Executive Officers):

H. A. Wilkin, Arusha.

E. S. Williams, Iringa.

R. G. Ellison, Moshi.

Office Superintendent: K. C. Pearson, Dar es Salaam.

Stenographer: Miss M. Wetjen, Dar es Salaam.

LIST OF PUBLIC GINNERIES LICENSED IN 1949

Province and District		Locality		No. of Gins		Licencees
				Saw	Roller	
<i>Eastern :</i>						
Morogoro	...	Morogoro	...	—	22	Tanganyika Cotton Co., Ltd.
Morogoro	...	Mikesse	...	—	20	Ladaks, Ltd.
Morogoro	...	Ngerengere	...	—	11	Liverpool Uganda Co., Ltd.
Morogoro	...	Duthumi	...	—	20	Tanganyika Cotton Co., Ltd.
Morogoro	...	Turiani	...	—	16	Tanganyika Cotton Co., Ltd.
Kilosa	...	Kilosa	...	—	18	Kilosa Ginnery, Ltd.
Kilosa	...	Rudewa	...	—	22	Tanganyika Cotton Co., Ltd.
Kilosa	...	Msowero	...	—	16	Msowero Ginnery, Ltd.
Bagamoyo	...	Mandera	...	—	20	Liverpool Uganda Co., Ltd.
Rufiji	...	Kilimani	...	—	12	Rufiji Gineries, Ltd.
Rufiji	...	Msomeni	...	—	15	Rufiji Gineries, Ltd.
Rufiji	...	Logeloge	...	—	12	Rufiji Gineries, Ltd.
Ulanga	...	Kiberege	...	—	16	Ulanga Cotton and Rice Industries Ltd.
Ulanga	...	Malinyi	...	—	12	ditto
<i>Lake :</i>						
Mwanza	...	Mwanza	...	—	28	Nakasero Commercial Corporation Ltd.
Mwanza	...	Murutunguru	...	—	24	Ladha Meghji and Sons, Ltd.
Mwanza	...	Ihale	...	—	14	Mwanza Cotton Trading Co., Ltd.
Mwanza	...	Bukumbi	...	—	15	Bhagwanji Sunderji and Co., Ltd.
Mwanza	...	Nassa	...	—	20	Sikh Ginners.
Mwanza	...	Buchosa	...	—	14	Buchosa Cotton Co., Ltd.
Kwimba	...	Pambani	...	—	17	Pambani, Ltd.
Kwimba	...	Nyambiti	...	—	22	Kwimba Gineries, Ltd.
Musoma	...	Mugango	...	—	20	Musoma Industries, Ltd.
Maswa	...	Malampaka	...	—	12	Bhagwanji Sunderji and Co., Ltd.
Maswa	...	Luguru	...	—	20	Bhagwanji Sunderji and Co., Ltd.
Shinyanga	...	Usogore	...	—	14	Bhagwanji Sunderji and Co., Ltd.
<i>Northern :</i>						
Moshi	...	Moshi	...	—	24	Moshi Trading Co., Ltd.
Mbulu	...	Idulu	...	—	12	Jamal Ramji and Co., Ltd.
<i>Southern :</i>						
Lindi	...	Mtua	...	—	14	Kikanda Cotton Trading Co., Ltd.
Tunduru	...	Tunduru	...	—	14	Kikanda Cotton Trading Co., Ltd.
Mikindani	...	Mikindani	...	—	5	Mikindani Cotton Co., Ltd.
<i>Tanga :</i>						
Korogwe	...	Korogwe	...	—	26	Moshi Trading Co., Ltd.
Handeni	...	Sinden	...	—	11	Moshi Trading Co., Ltd.

COTTON STATISTICS: SEASON 1949

(By Districts)

Appendix V

Provinces and Districts		No. of Growers (Approximate)	Quantity of seed distributed in tons	Quantity of seed-cotton marketed			Approximate Total Cash Revenue to natives Shs.
				1st Grade Tons	3rd Grade Tons	Total Tons	
<i>Lake:</i>							
Musoma	...	10,500	610	2,121	187	2,308	1,148,240
Mwanza	...	80,000	2,557	13,257	314	13,586 A	7,232,540
Kwimba	...	30,560	1,421	3,168	184	3,352	1,687,700
Maswa	...	25,500	1,252	2,127	166	2,293	1,223,540
Shinyanga	...	14,000	535	335	151	486	208,800
<i>Tanga:</i>							
Lushoto	...	4,000	40	29	5	34	17,770
Handeni	...	5,800	82	172	20	192	75,000
Pare	...	9,000	87	38	20	58	26,030
<i>Northern:</i>							
Arusha	...	400	7	3	1	4	1,700
Moshi	...	1,600	30	140	37	177	88,730
Mbulu	...	200	2	4	1	5	2,230
<i>Eastern:</i>							
Kilosa	...	6,694	316	1,006	188	2,320 B	624,420
Morogoro	...	6,570	379	1,215	245	2,048 C	724,000
Ulanga	...	12,200	226	1,664	175	1,860 D	869,880
Bagamoyo	...	6,934	116	729	84	816 E	417,300
Rufiji	...	11,247	121	202	96	303 F	116,380
Uzaramo	...	—	—	14	5	19	8,700
<i>Southern:</i>							
Lindi	...	400	6	14	—	14	7,630
Masasi	...	400	6	3	—	3	2,070
Tunduru	...	1,200	18	123	—	123	58,240
Mikindani	...	1,200	18	33	3	36	19,830
Total ...		228,405	7,829	26,397	1,882	30,037	14,560,730

A. Includes 15 tons of planters' crop cotton. B. Includes 1,126 tons of planters' crop cotton. C. Includes 588 tons of planters' crop cotton. D. Includes 22 tons of planters' crop cotton. E. Includes 3 tons of planters' crop cotton. F. Includes 5 tons of planters' crop cotton.

